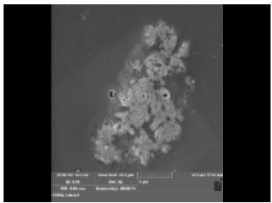
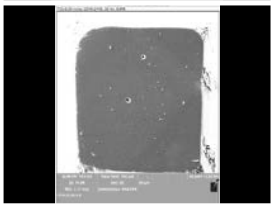
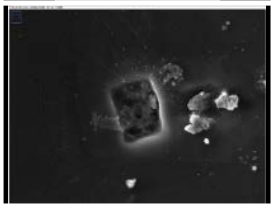
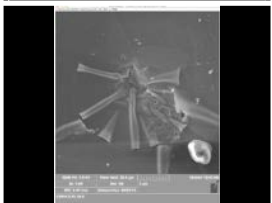
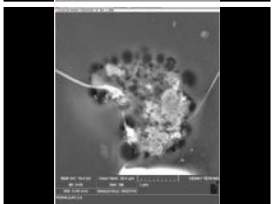

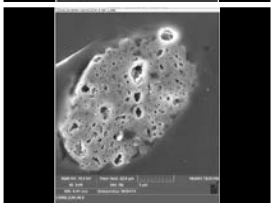
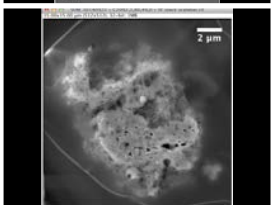


Bullet C2004, 1,44,4,0
Vega
Bullet for O-isotopes.

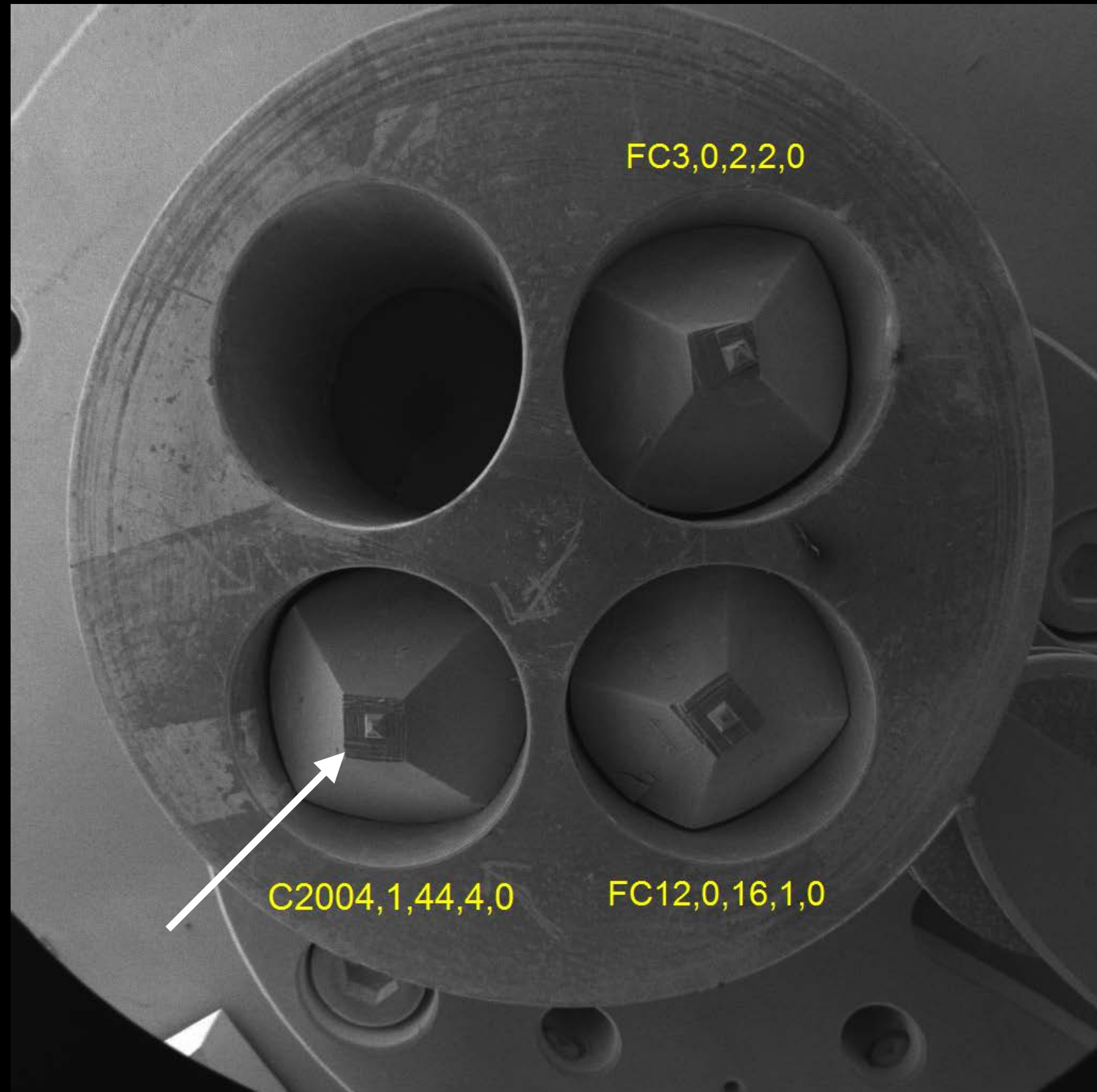
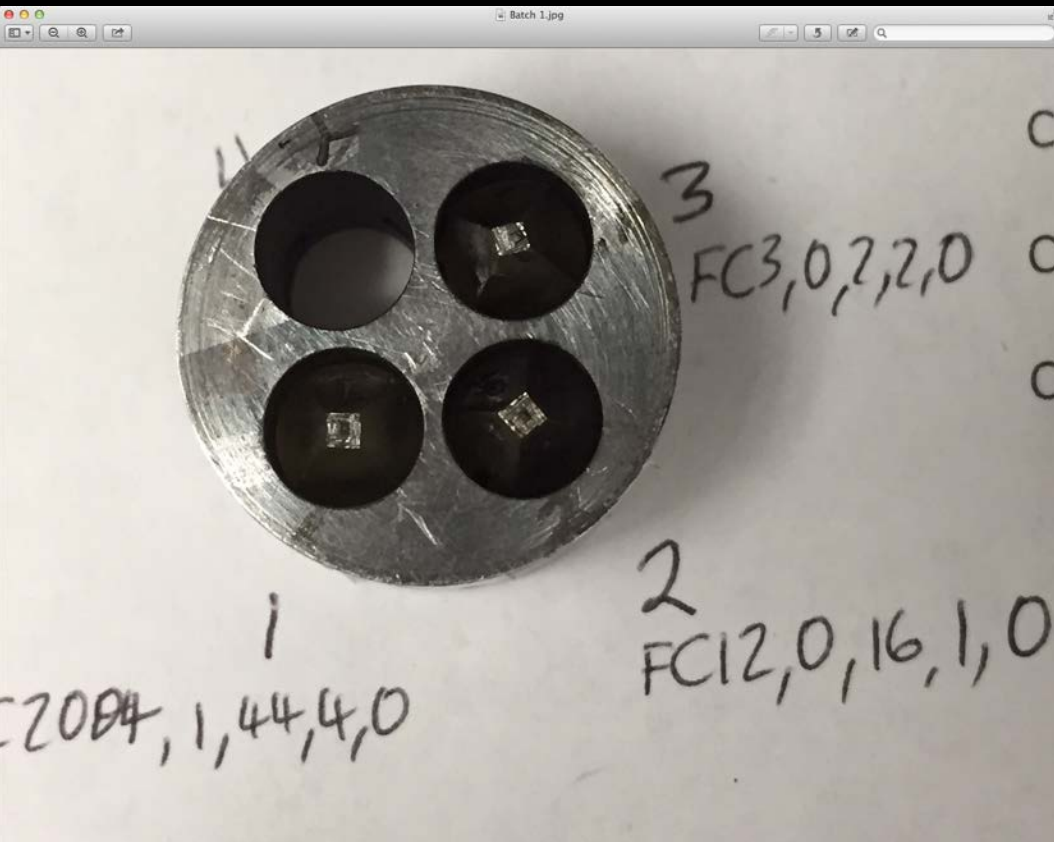
Zack Gainsforth

22 Sep 2014

Summary

Bullet	Image	EDS	Summary	Recommend SIMS?
C2004,1,44,4,0		Y	Material clearly visible. Fine grained.	Y
FC12,0,16,1,0		N	Nothing visible.	N
FC3,0,2,2,0		N	Material visible, but likely altered by previous experiment.	N
C2054,0,35,16,0		N	Material visible, possibly altered by previous experiment	N
C2044,2,41,3,0		Y	Material visible. Heterogeneous assembly of different phases.	Y
C2092,2,80,46,0		Y	Aerogel visible, not clear if much track is present.	Y
C2092,2,80,48,0		Y	Material clearly visible. Fine grained.	Y
C2092,2,80,49,0		Y	Material clearly visible. Fine grained.	Y

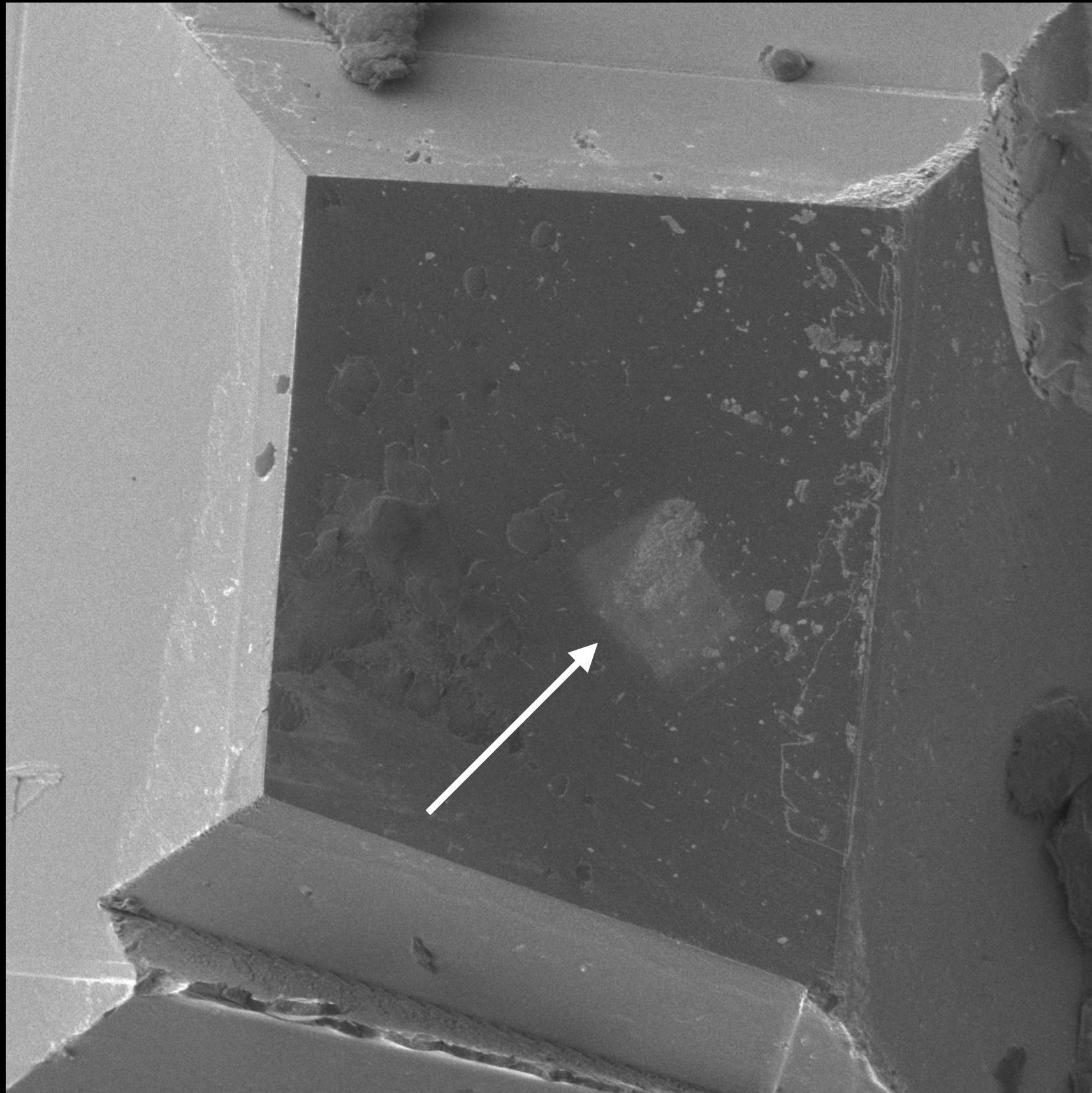
Overview of first batch



SEM HV: 1.0 kV	View field: 17.6 mm	5 mm	VEGA3 TESCAN
BI: 13.00	Det: SE		
WD: 20.00 mm	Date(m/d/y): 09/22/14		

Overview 1

C2004,1,44,4,0



SEM HV: 1.0 kV

View field: 195 μ m

VEGA3 TESCAN

BI: 10.00

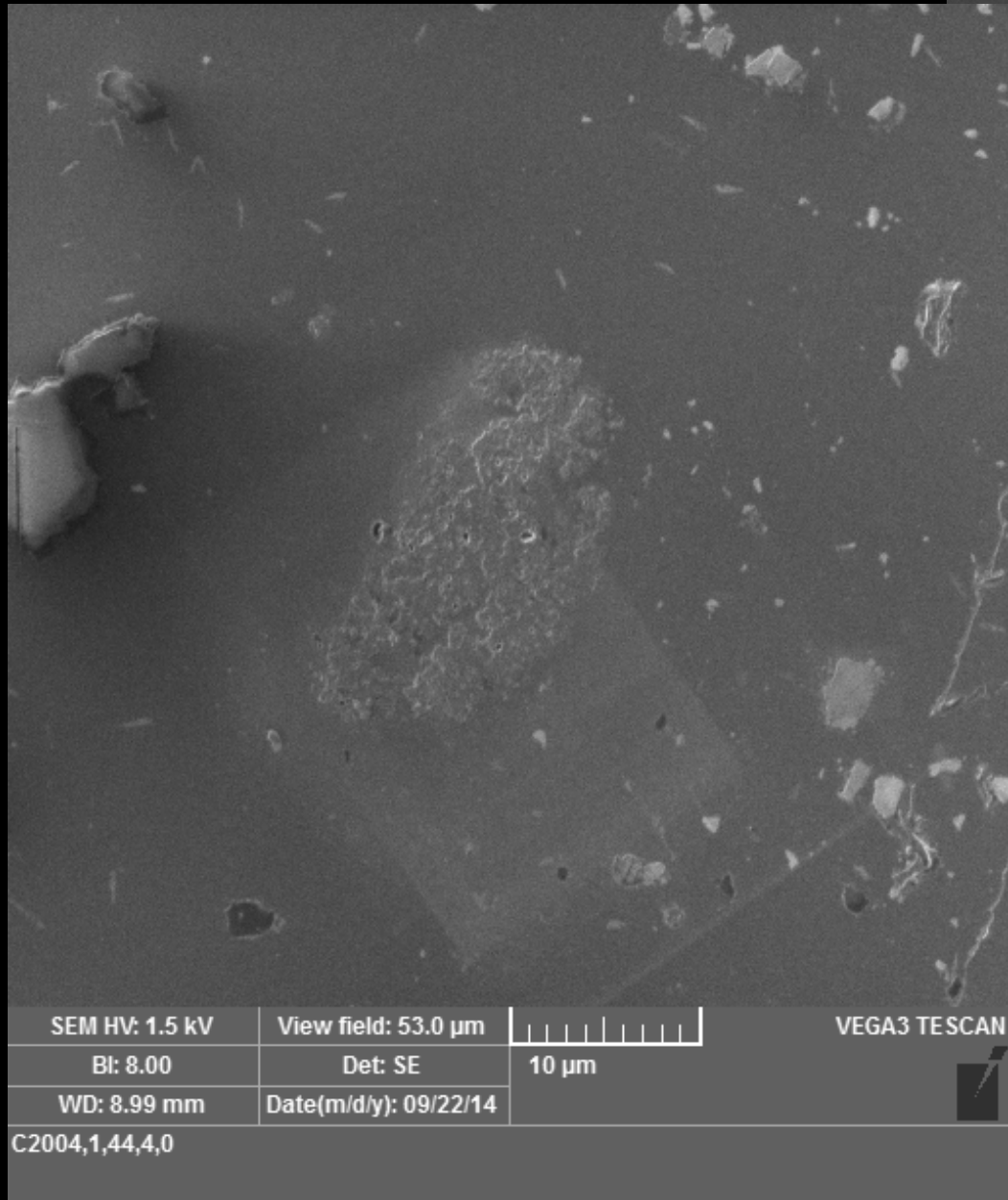
Det: SE

50 μ m

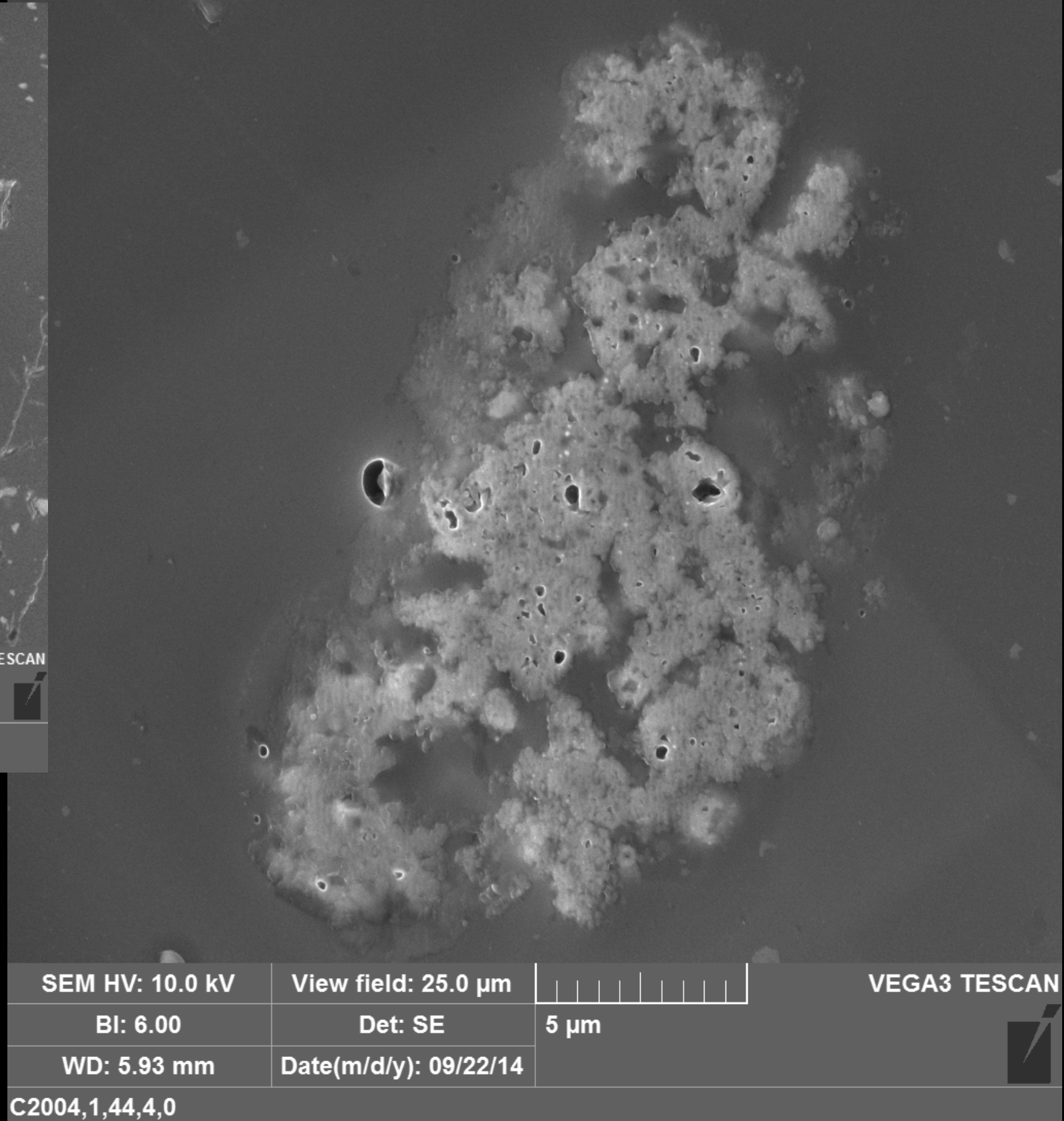
WD: 9.01 mm

Date(m/d/y): 09/22/14

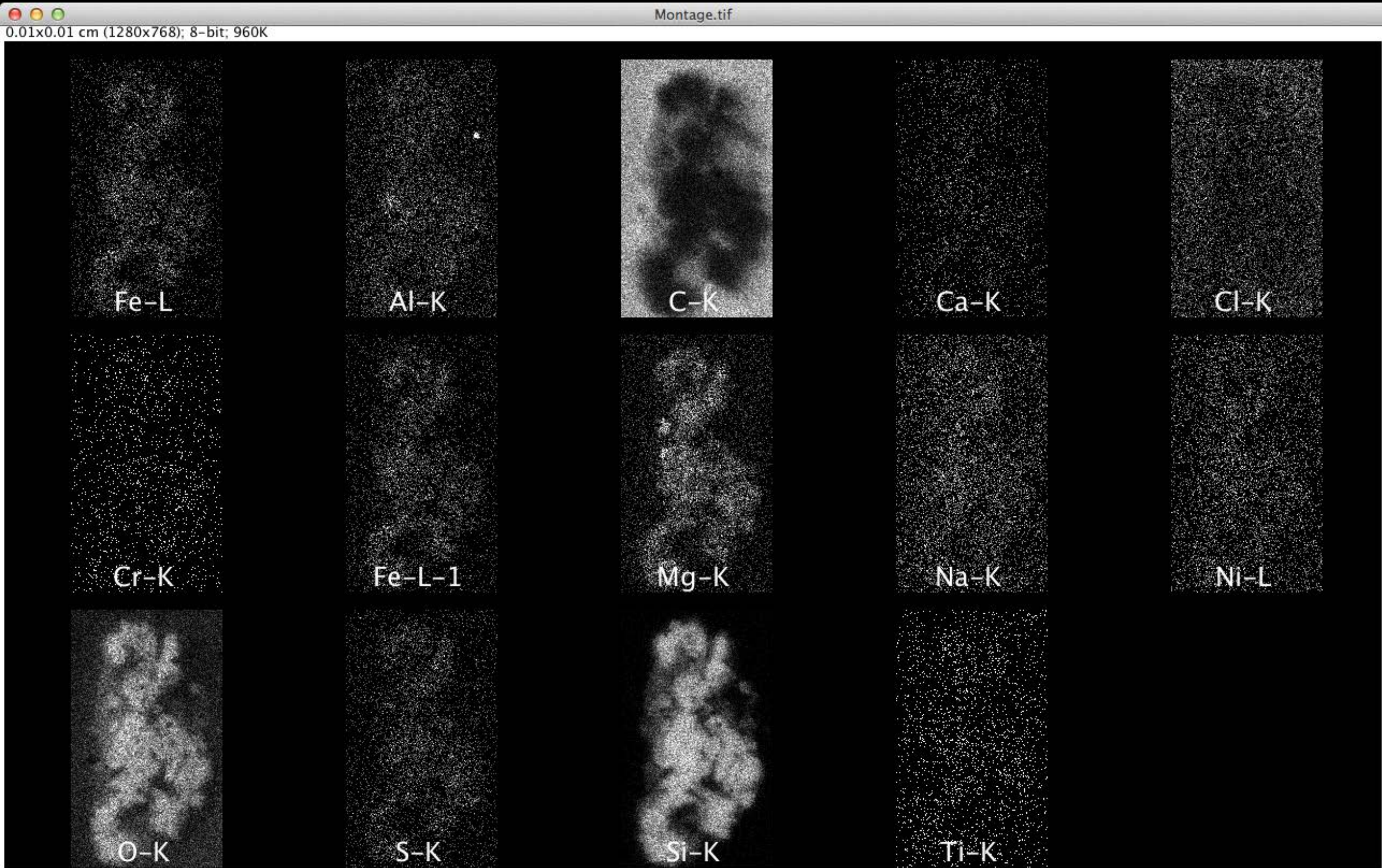
C2004,1,44,4,0



Oh my! Beautiful bulb material.

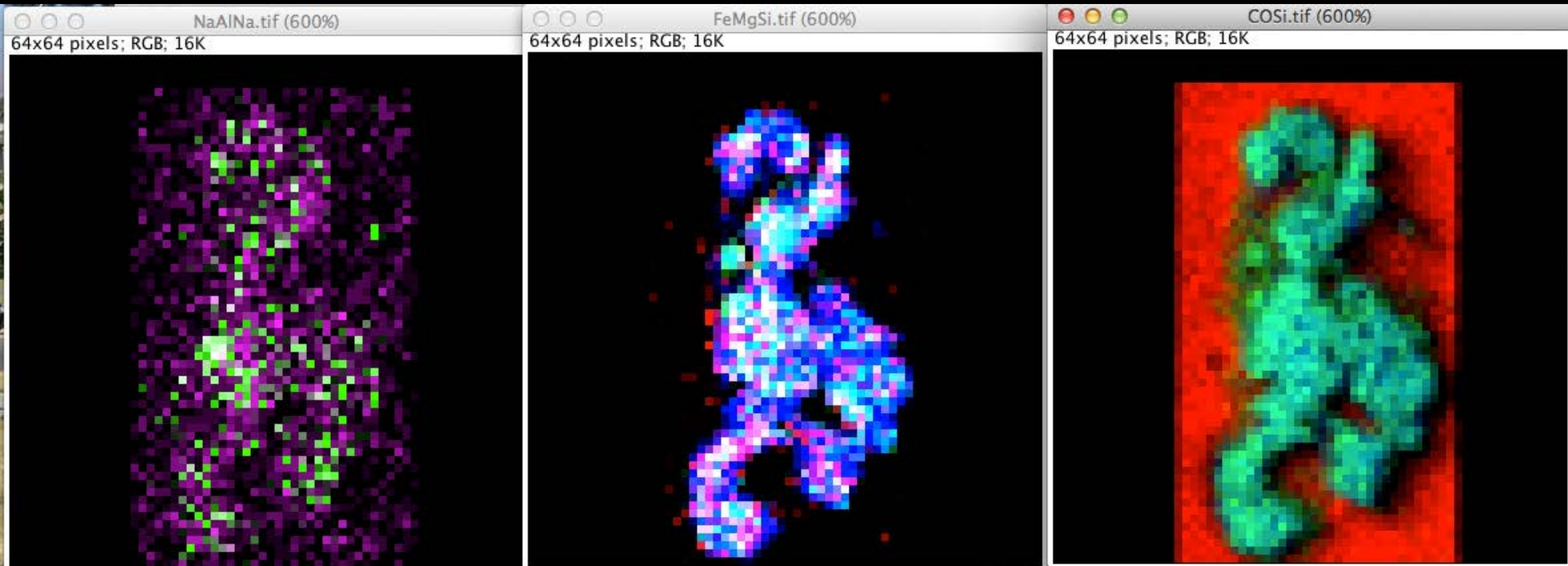


C2004,1,44,4,0, EDS

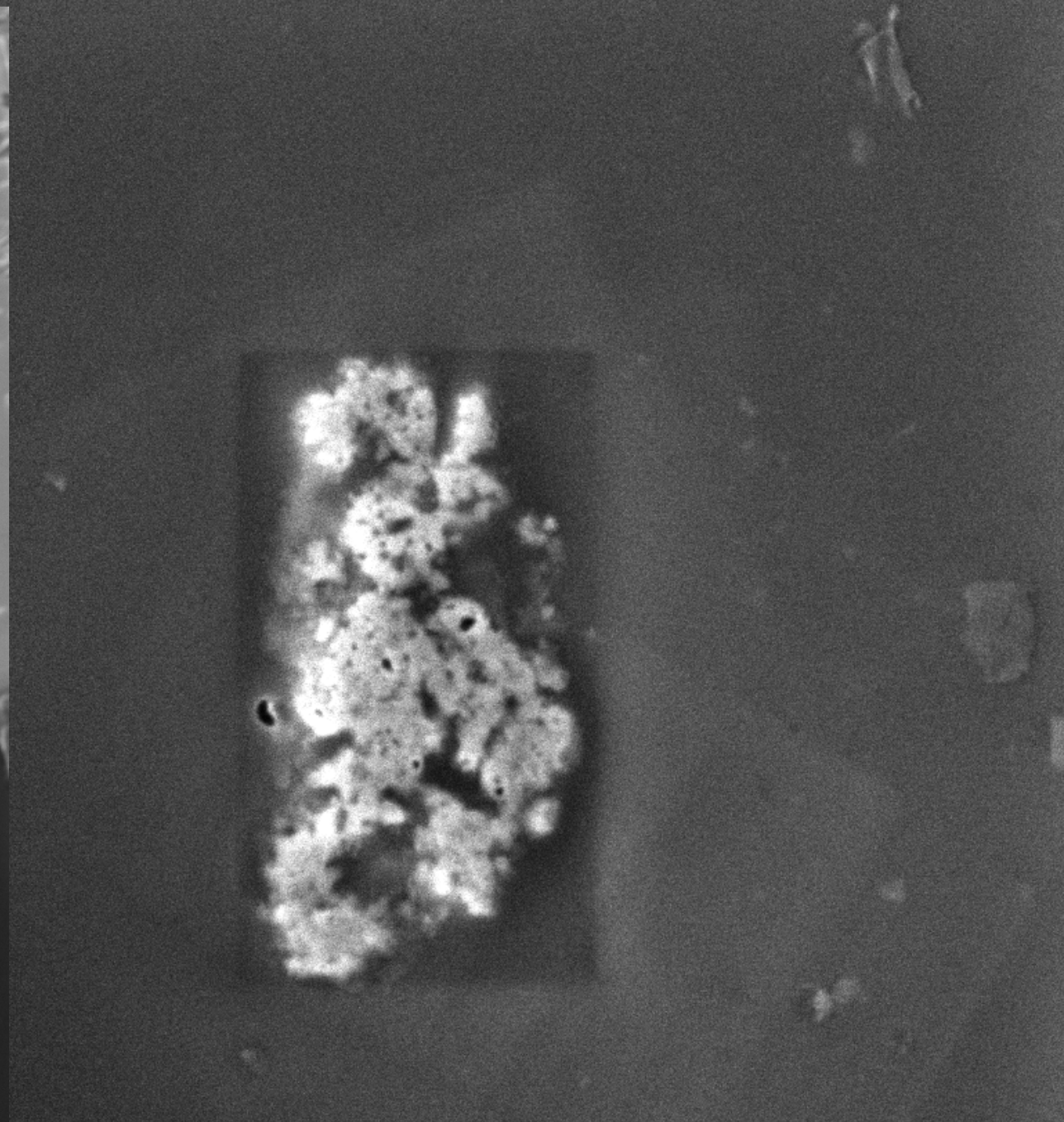
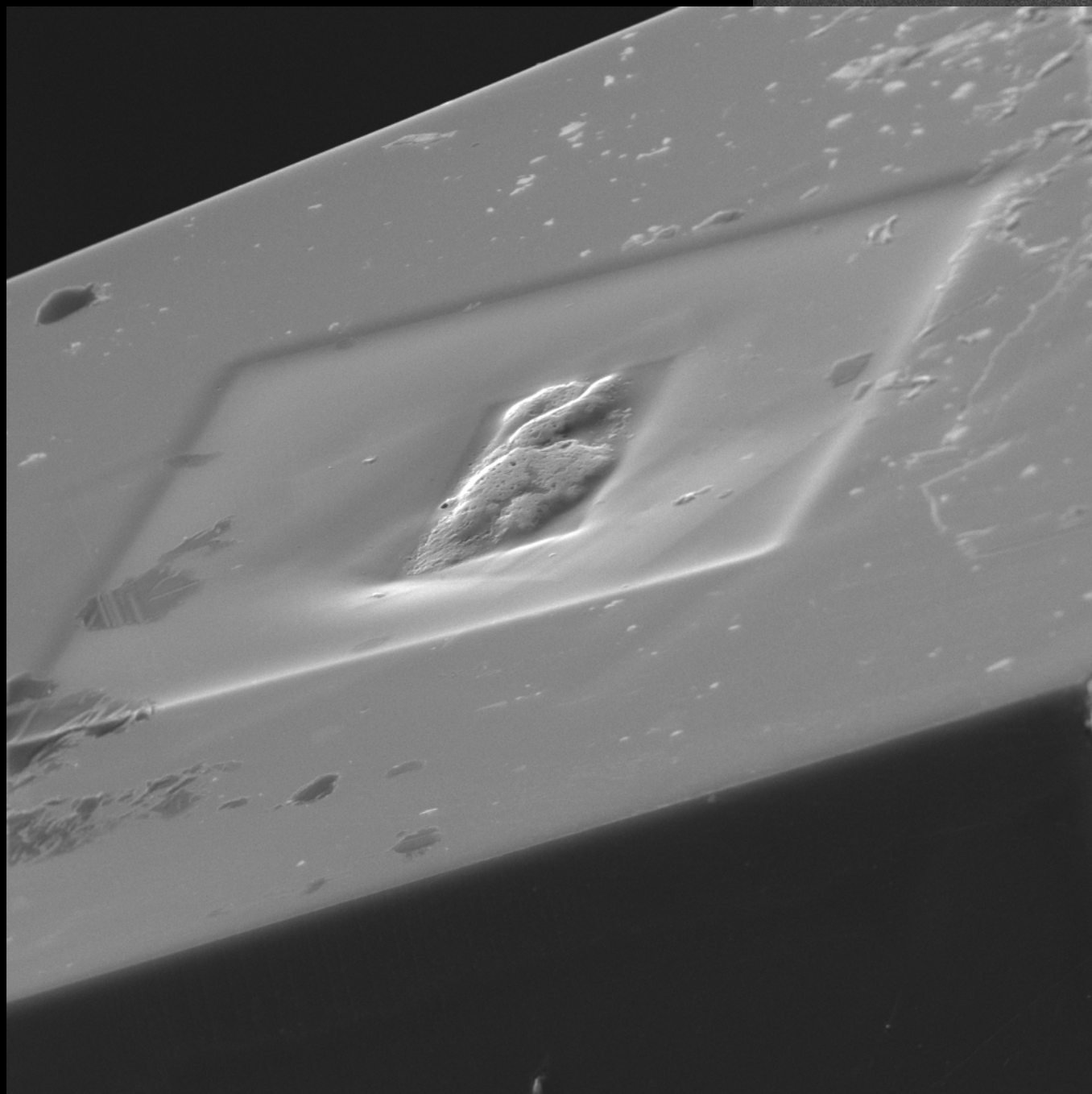


Notice shadow grains showing up in Mg and Al, and actually Na (barely).

C2004,1,44,4,0, EDS



C2004,1,44,4,0 - After EDS



SEM HV: 10.0 kV	View field: 64.2 μm	VEGA3 TESCAN
BI: 9.00	Det: SE	20 μm
WD: 12.88 mm	Date(m/d/y): 09/22/14	

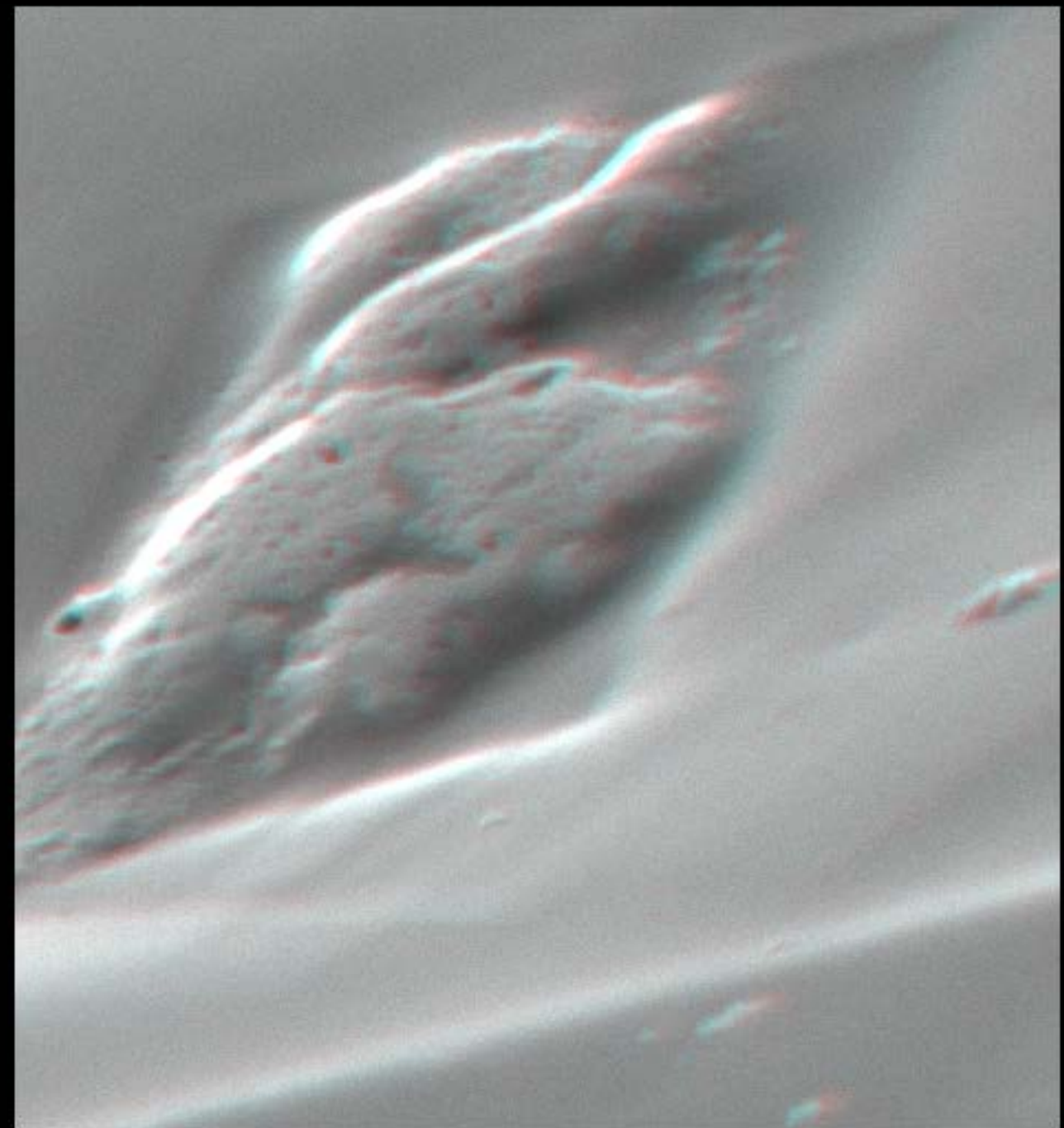
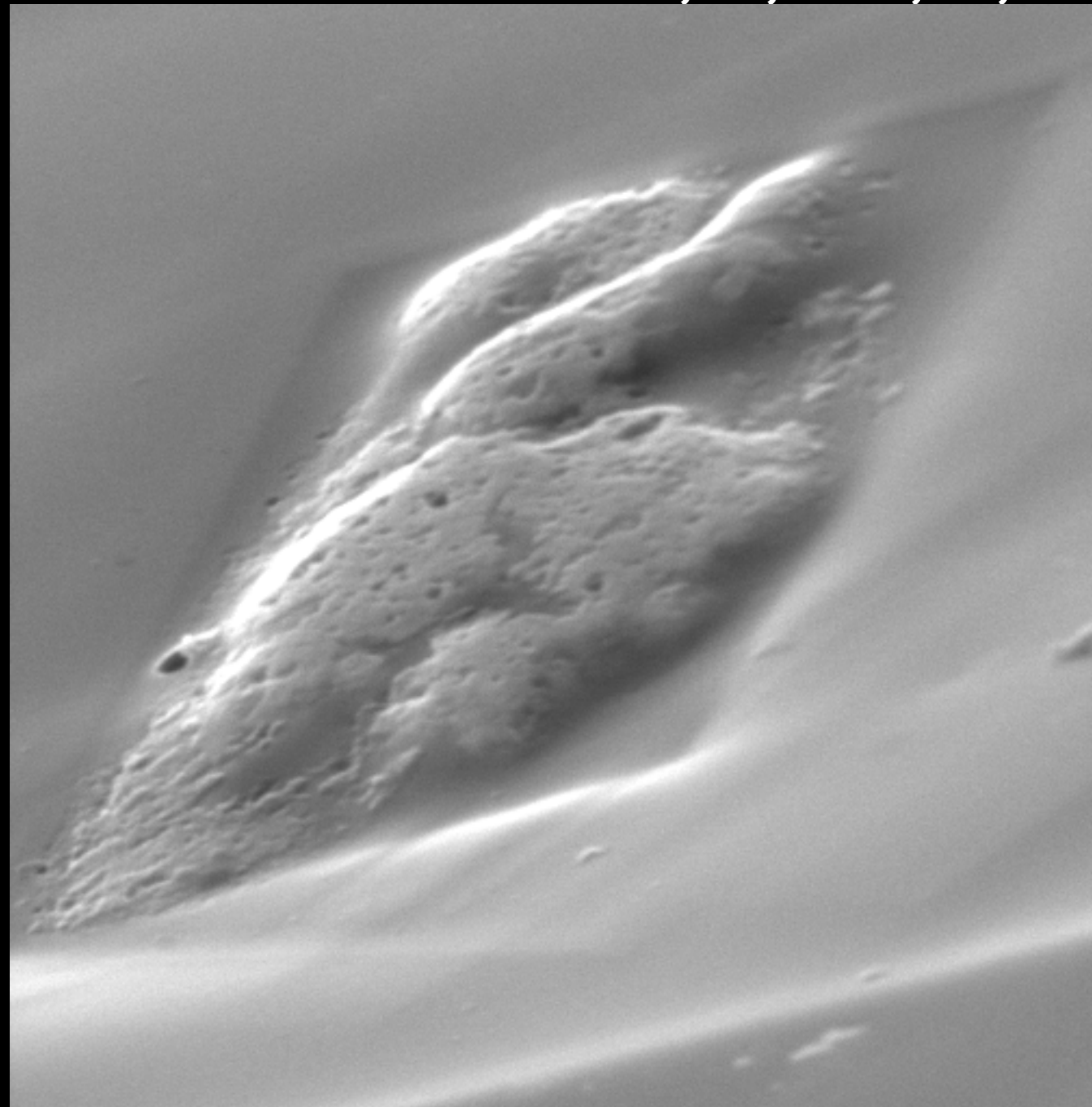
C2004,1,44,4,0 - after EDS

SEM HV: 10.0 kV	View field: 50.0 μm	VEGA3 TESCAN
BI: 12.00	Det: SE	10 μm
WD: 13.25 mm	Date(m/d/y): 09/22/14	

C2004,1,44,4,0 - after EDS

Some epoxy shrinkage from the EDS.

C2004,1,44,4,0 - After EDS - 3D



SEM HV: 10.0 kV

View field: 16.9 μm

VEGA3 TESCAN

SEM HV: 10.0 kV

View field: 16.9 μm

VEGA3 TESCAN

Bl: 9.00

Det: SE

5 μm

Bl: 9.00

Det: SE

5 μm

WD: 12.88 mm

Date(m/d/y): 09/22/14

WD: 12.88 mm

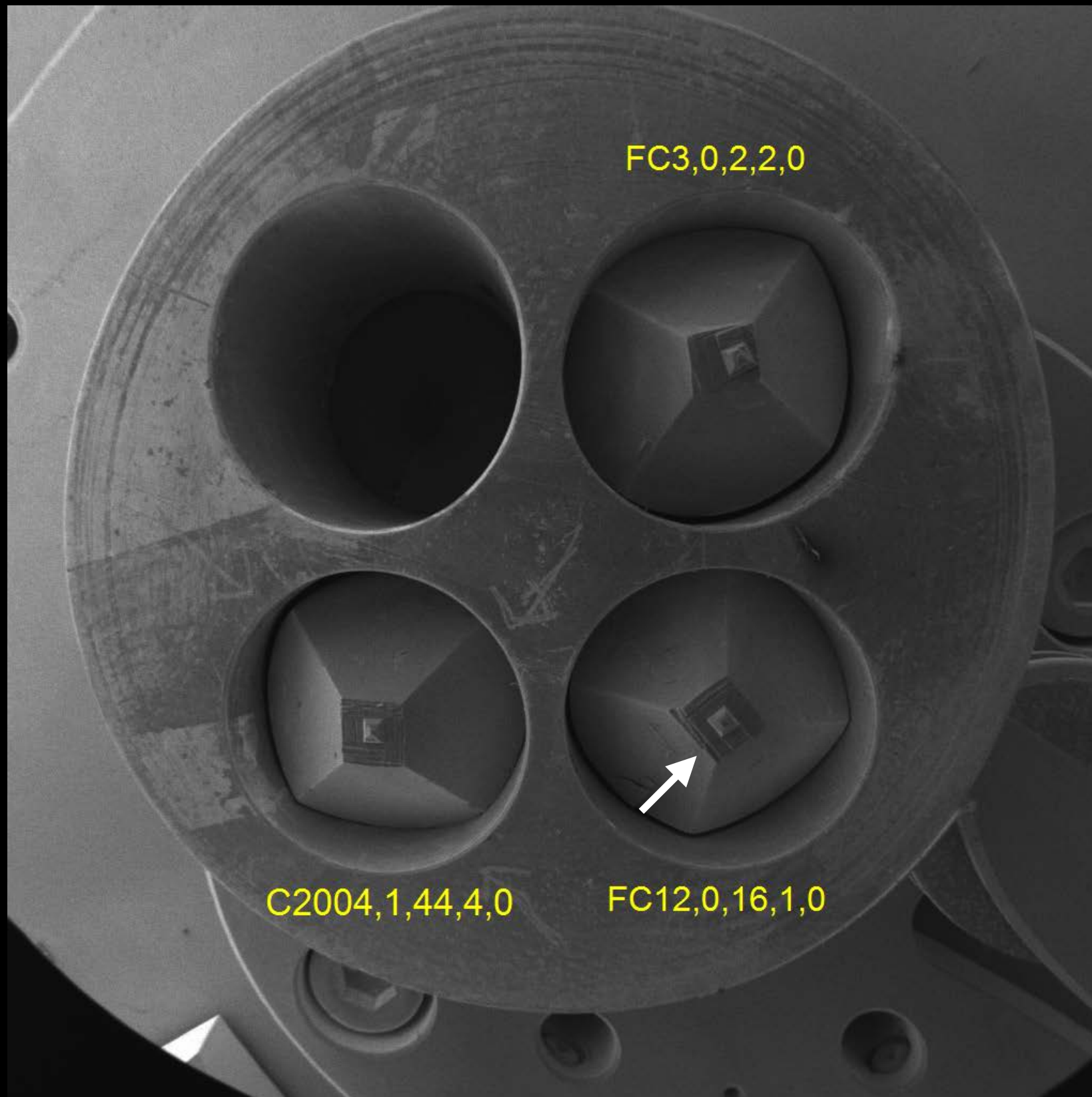
Date(m/d/y): 09/22/14

C2004,1,44,4,0 - after EDS tilted 70 deg, 3D 0.49 deg

C2004,1,44,4,0 - after EDS tilted 70 deg, 3D 0.49 deg

Estimated topography ≤ 1 micron.

Overview



SEM HV: 1.0 kV

View field: 17.6 mm

VEGA3 TESCAN

BI: 13.00

Det: SE

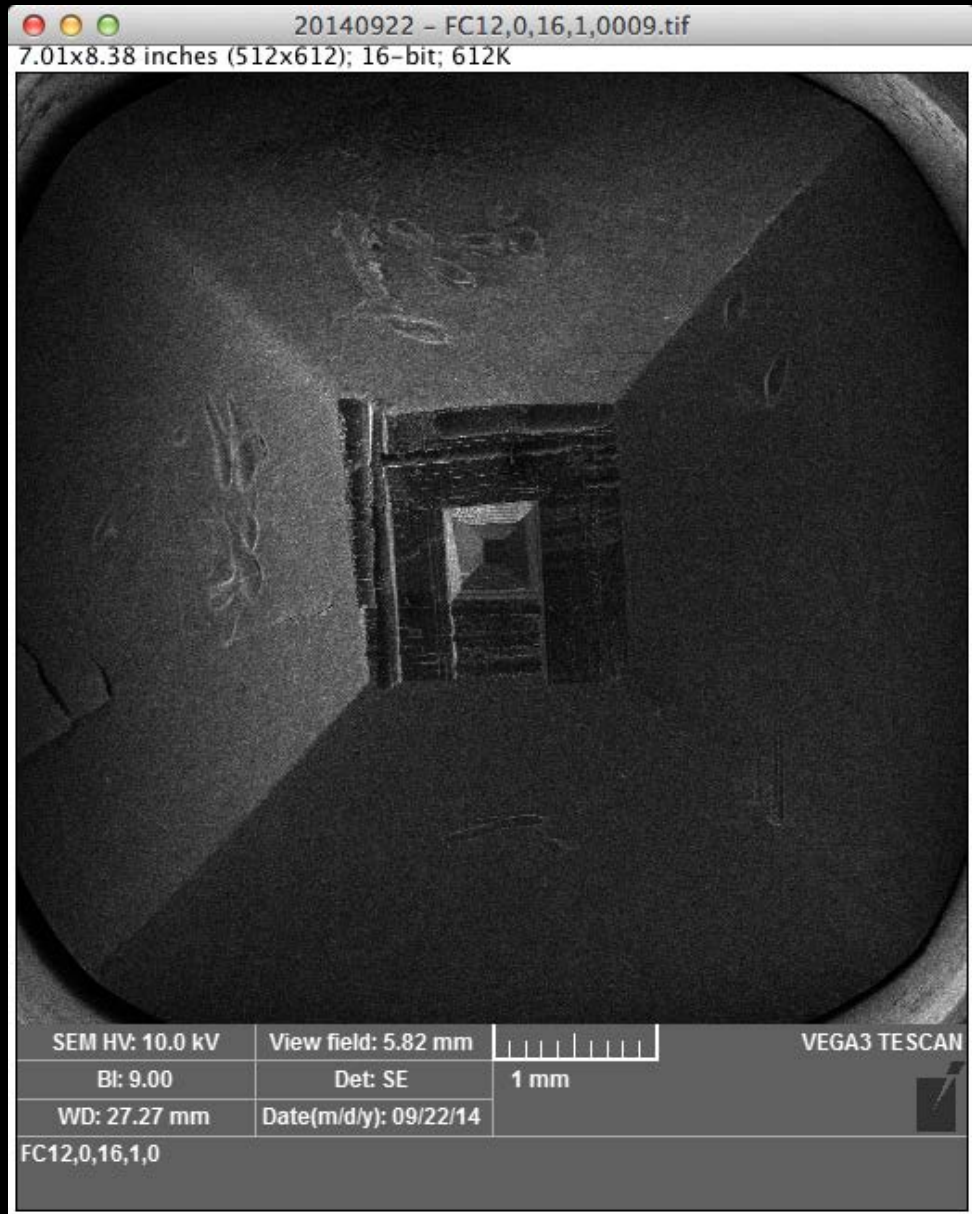
5 mm

WD: 20.00 mm

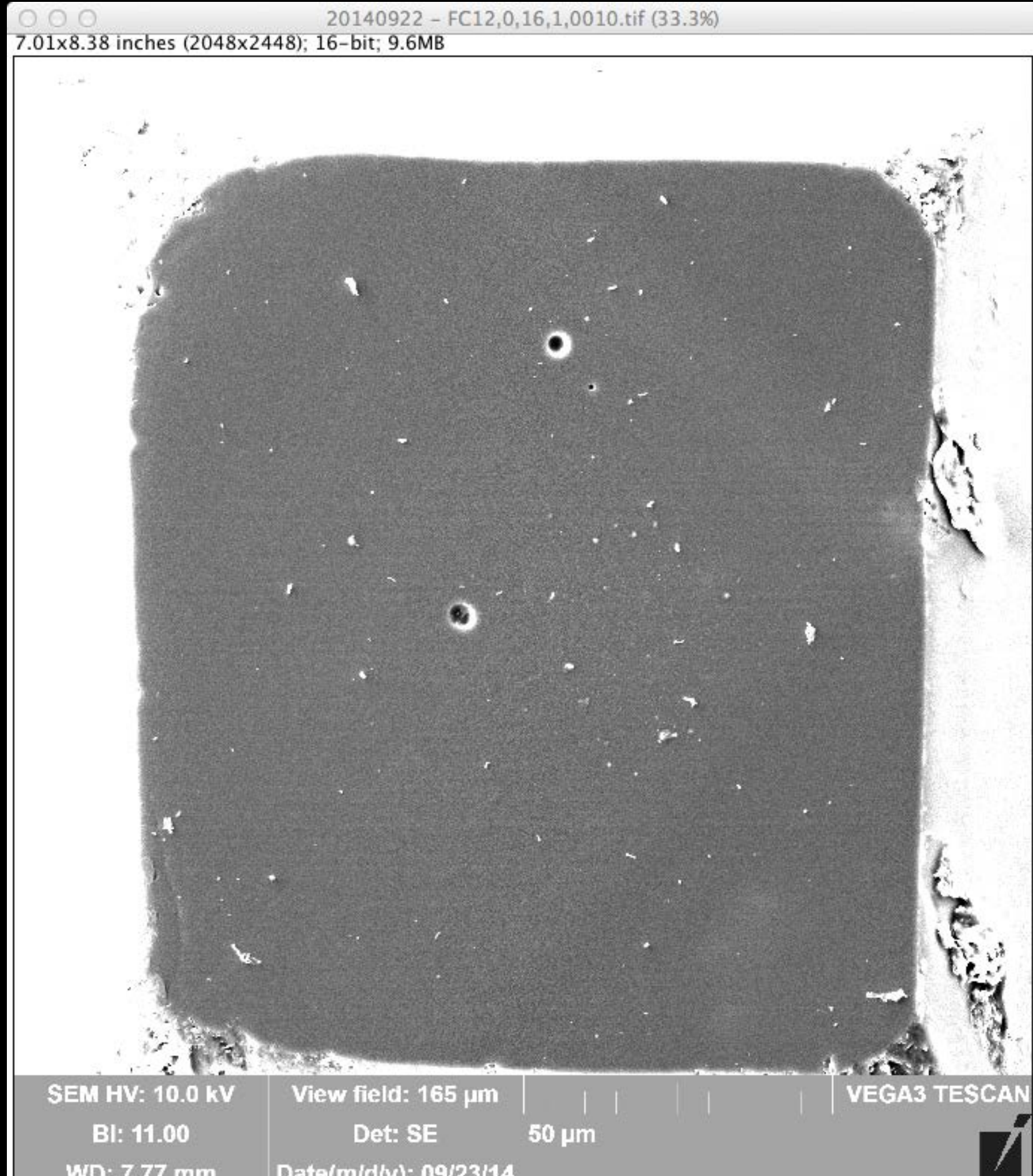
Date(m/d/y): 09/22/14

Overview 1

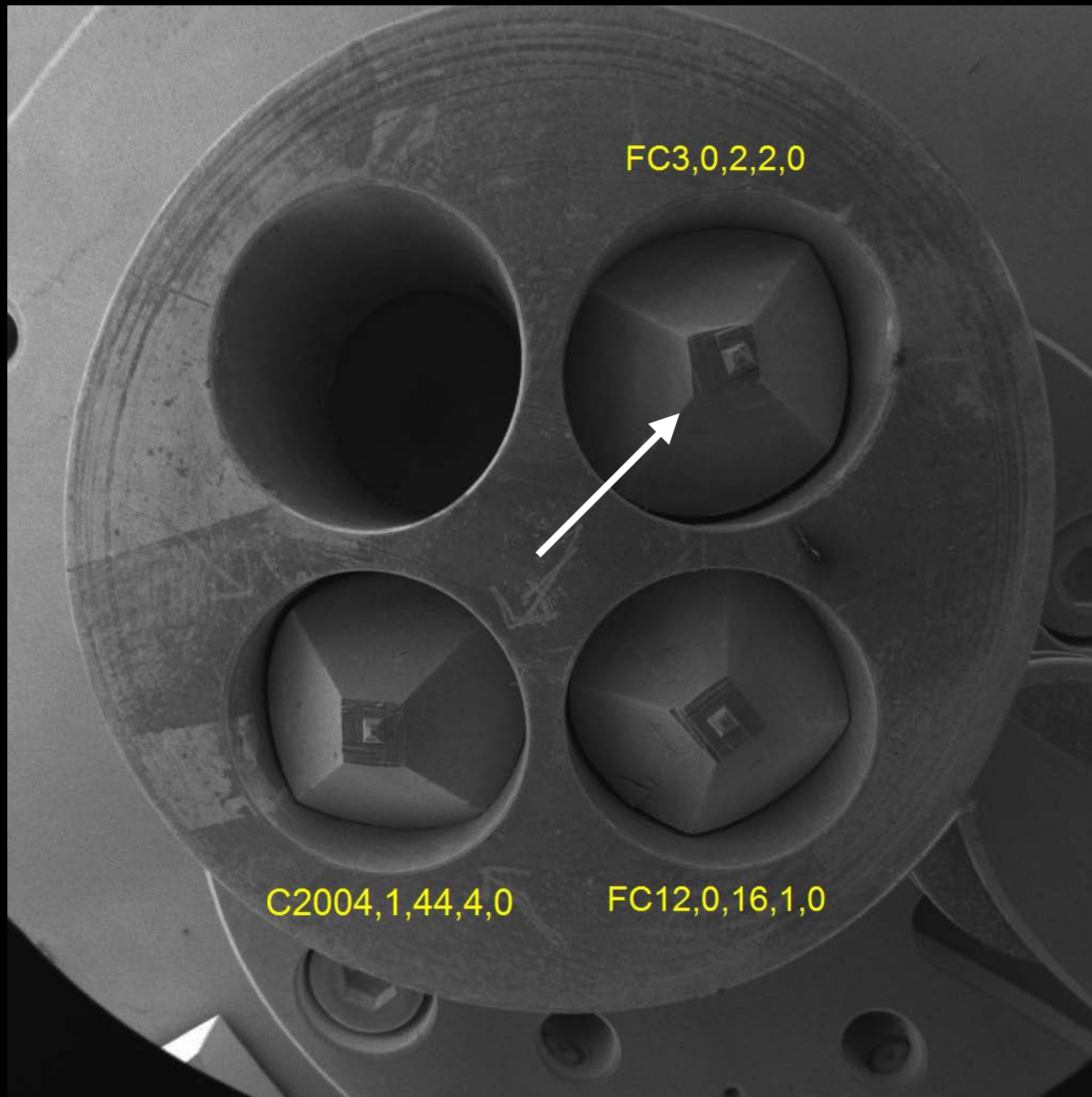
FC12,0,16,1,0



Not really seeing much here.

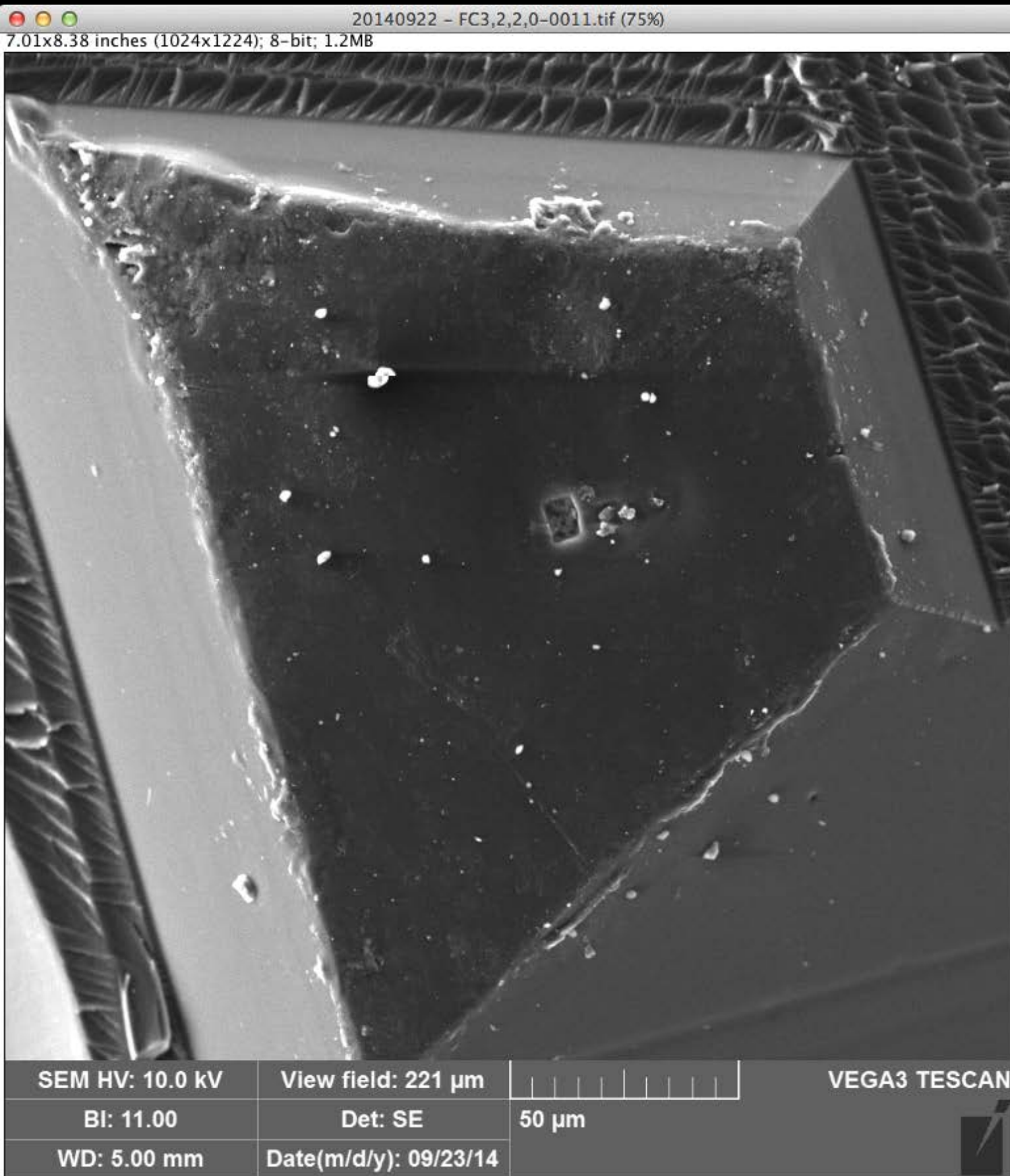


Overview



SEM HV: 1.0 kV	View field: 17.6 mm	5 mm	VEGA3 TESCAN
BI: 13.00	Det: SE		
WD: 20.00 mm	Date(m/d/y): 09/22/14		

FC3,0,2,2,0

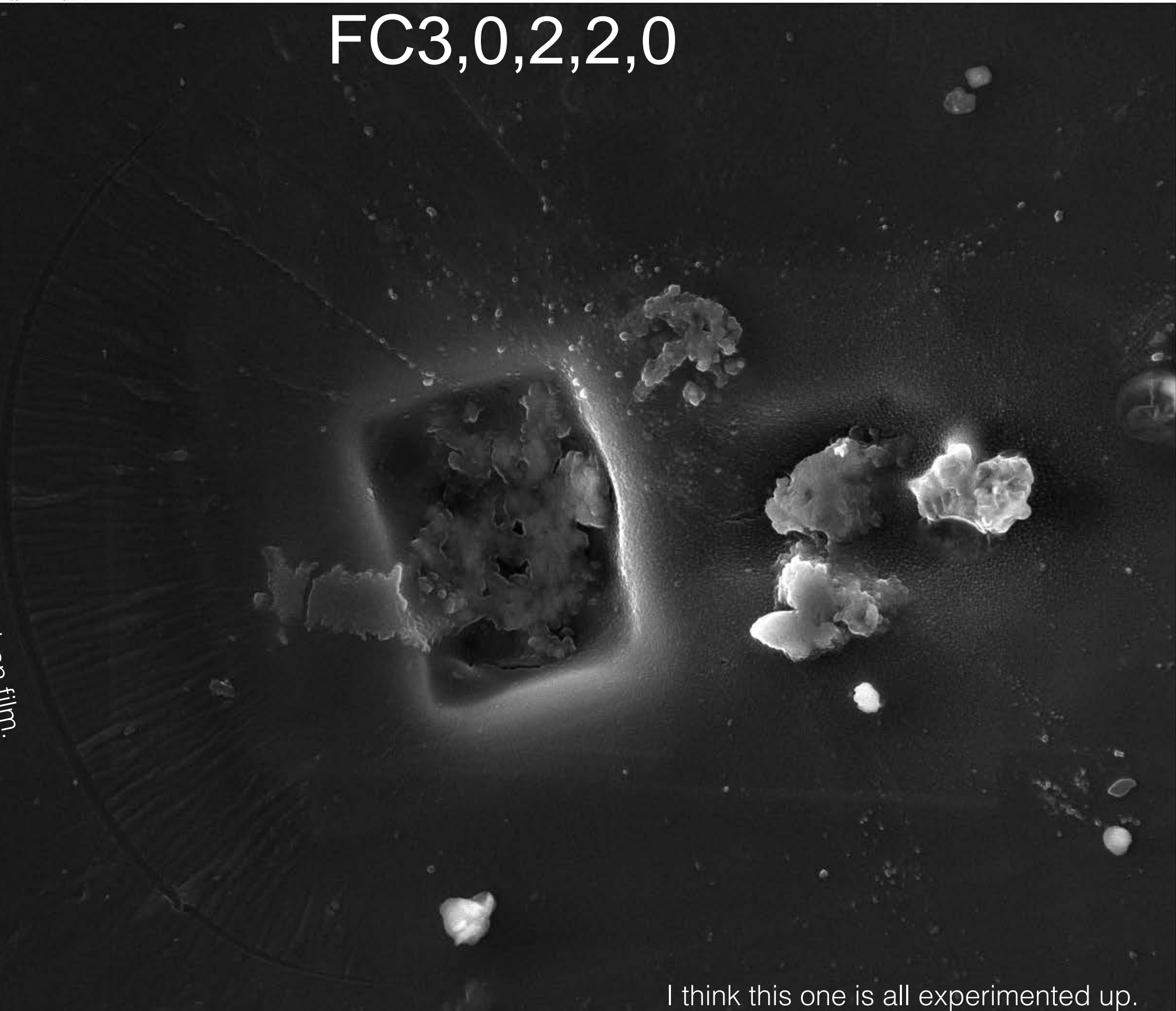


Already a crater in the middle.

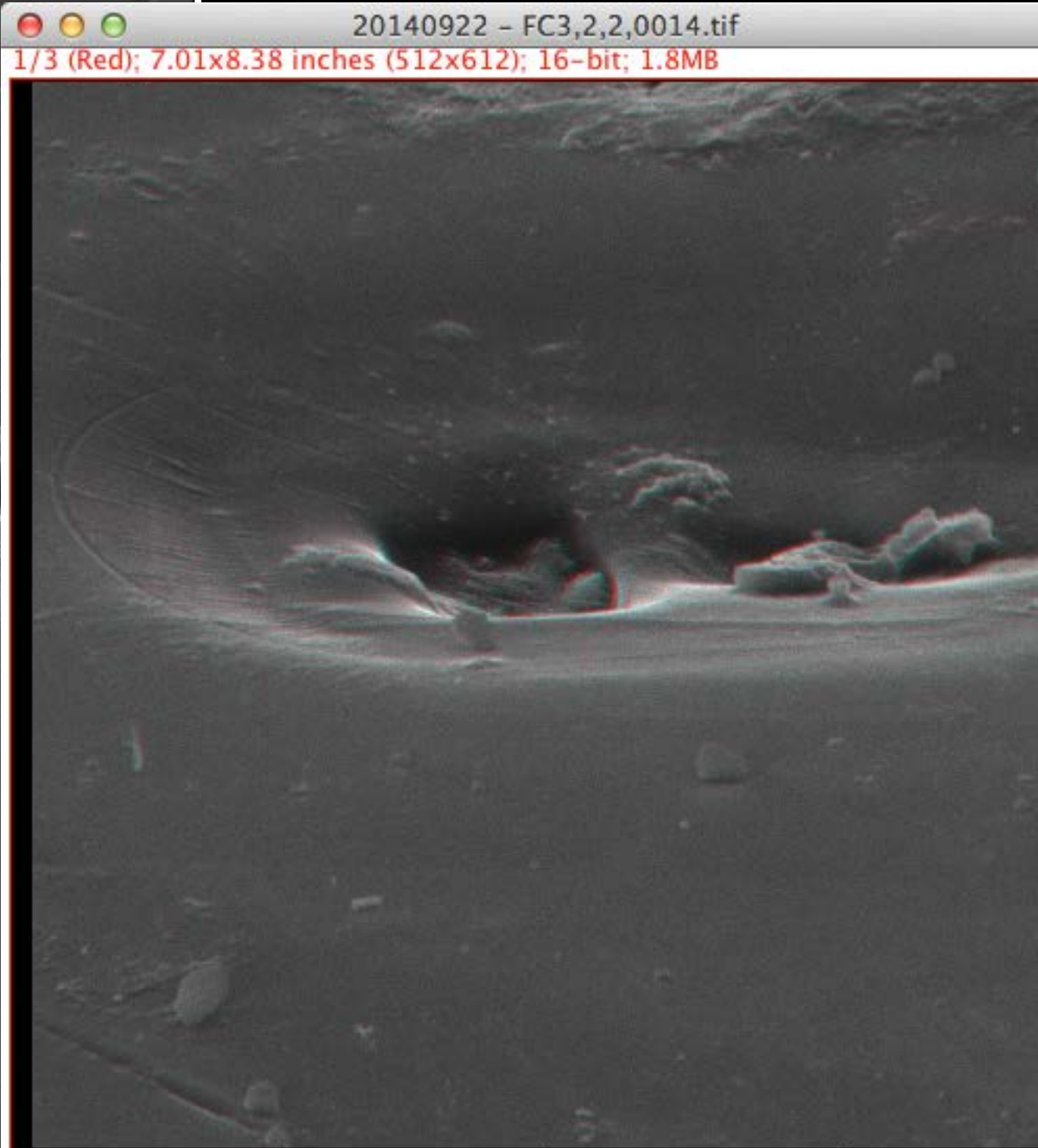
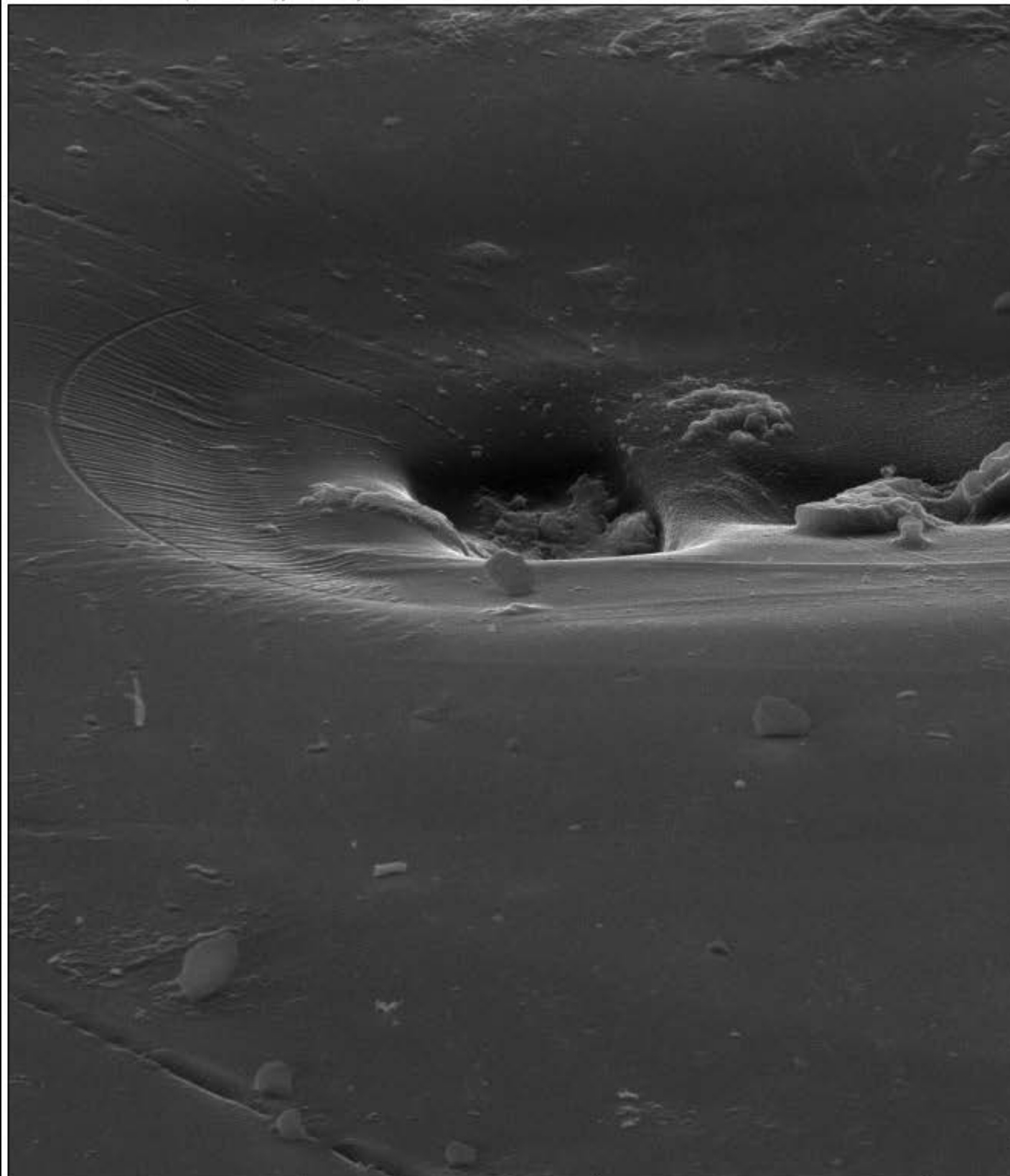
FC3,0,2,2,0

Broken carbon film.

I think this one is all experimented up.



FC3,0,2,2,0



SEM HV: 10.0 kV	View field: 35.9 μ m	VEGA3 TESCO
Bl: 8.00	Det: SE	10 μ m
WD: 9.12 mm	Date(m/d/y): 09/23/14	

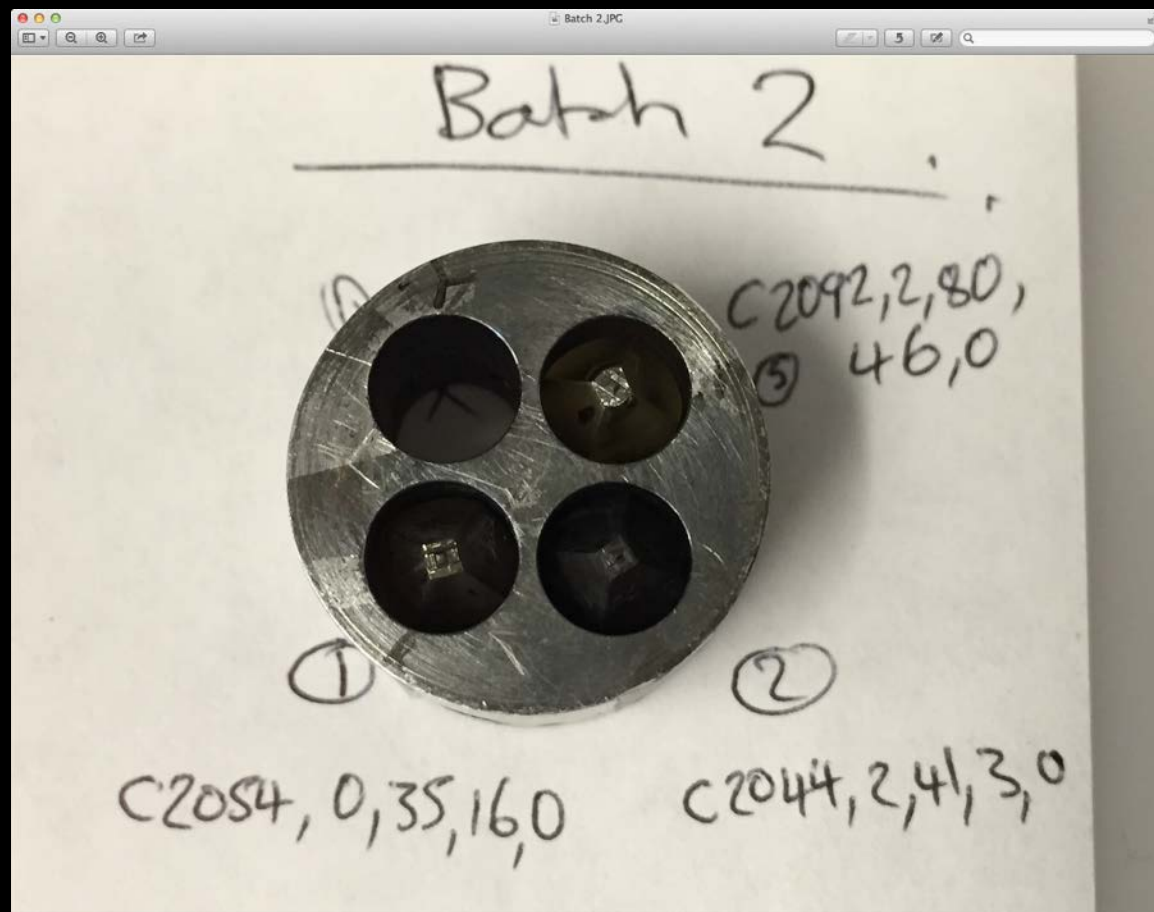
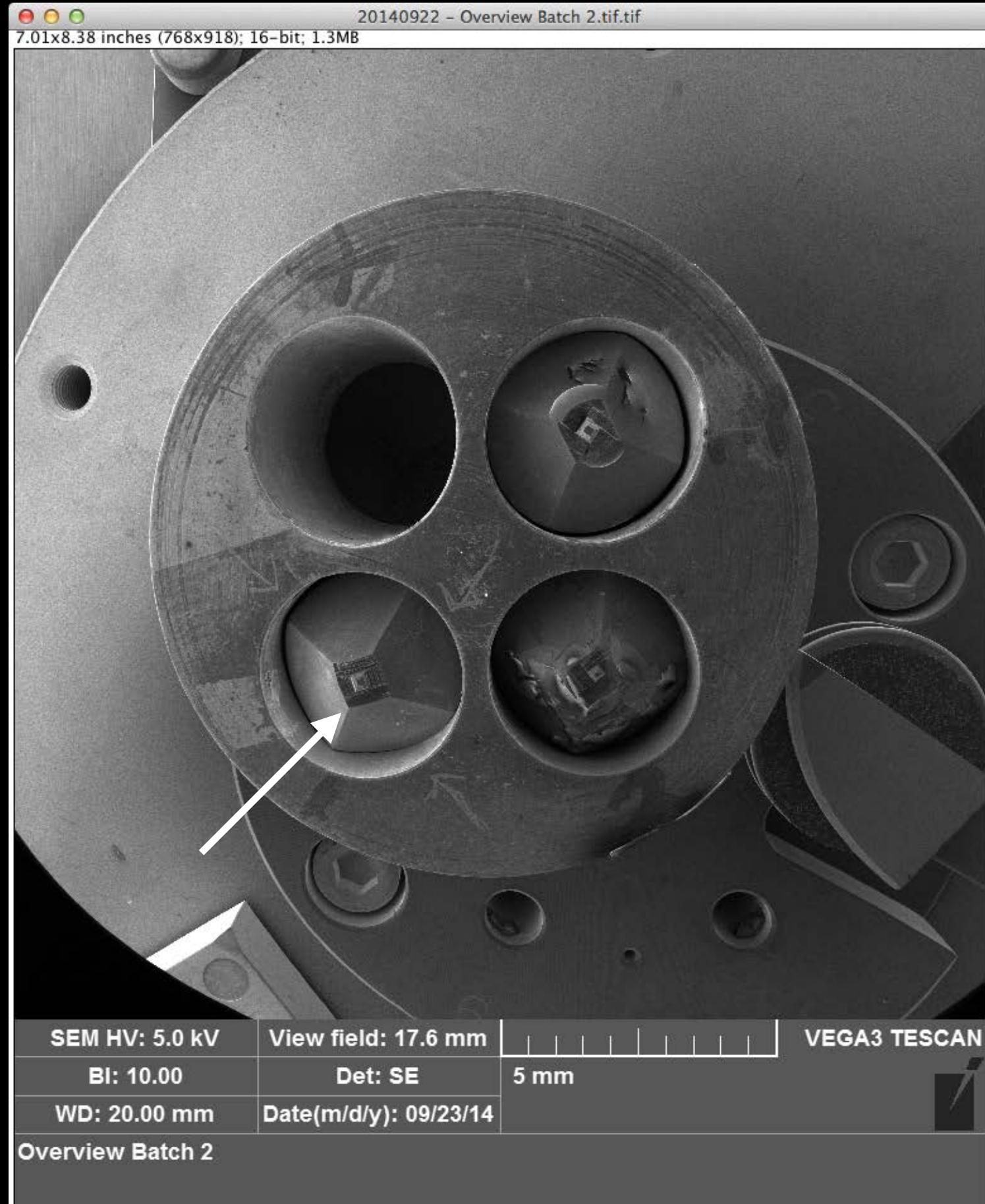
FC3,0,2,2,0 - 3D at 70 deg stage tilt - 0.63 deg beam tilt

SEM HV: 10.0 kV	View field: 35.9 μ m	VEGA3 TESCO
Bl: 8.00	Det: SE	10 μ m
WD: 9.12 mm	Date(m/d/y): 09/23/14	

FC3,0,2,2,0 - 70 deg stage tilt

c

Overview of second batch



C2054,0.35,16,0

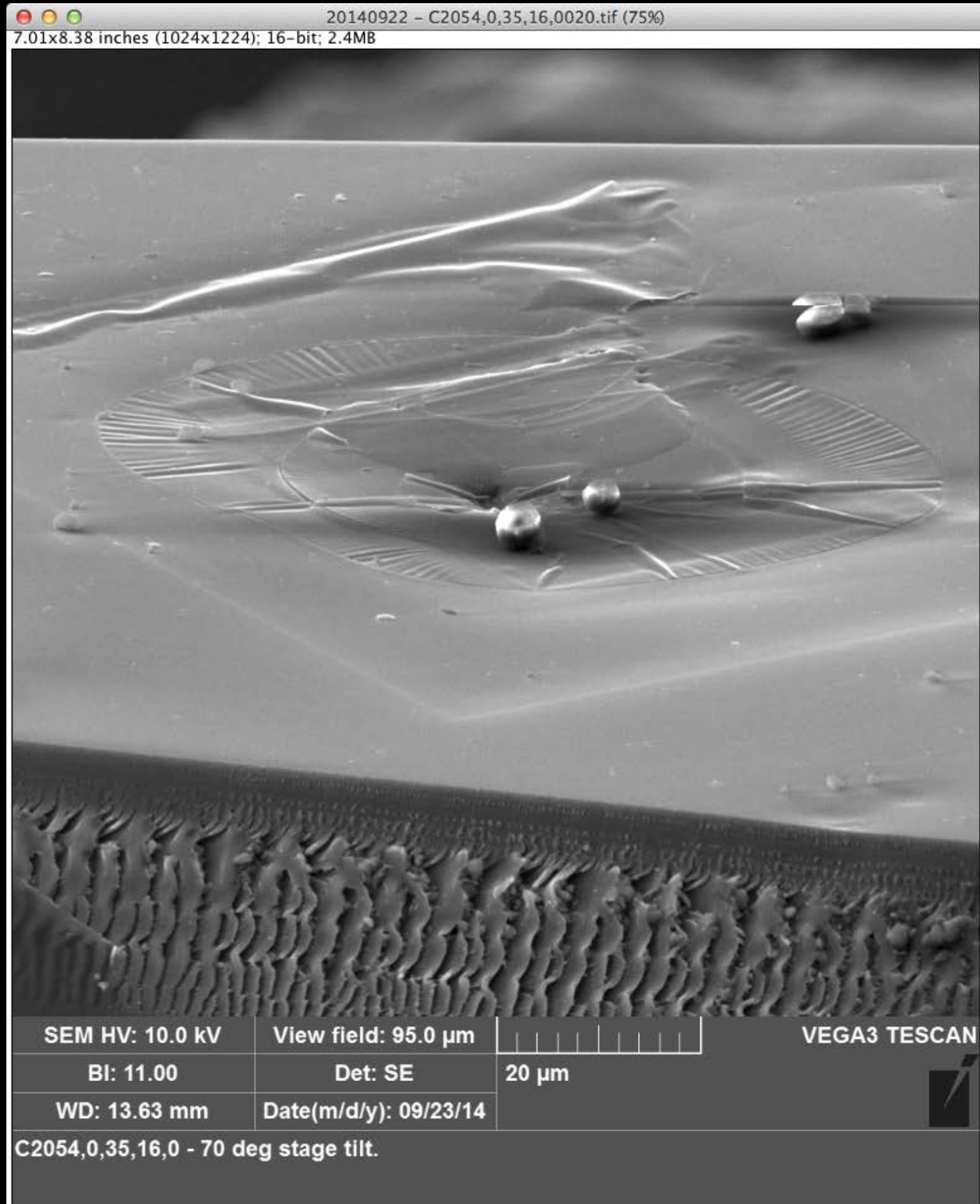


Another "been used" particle.
Might still be useful around here.

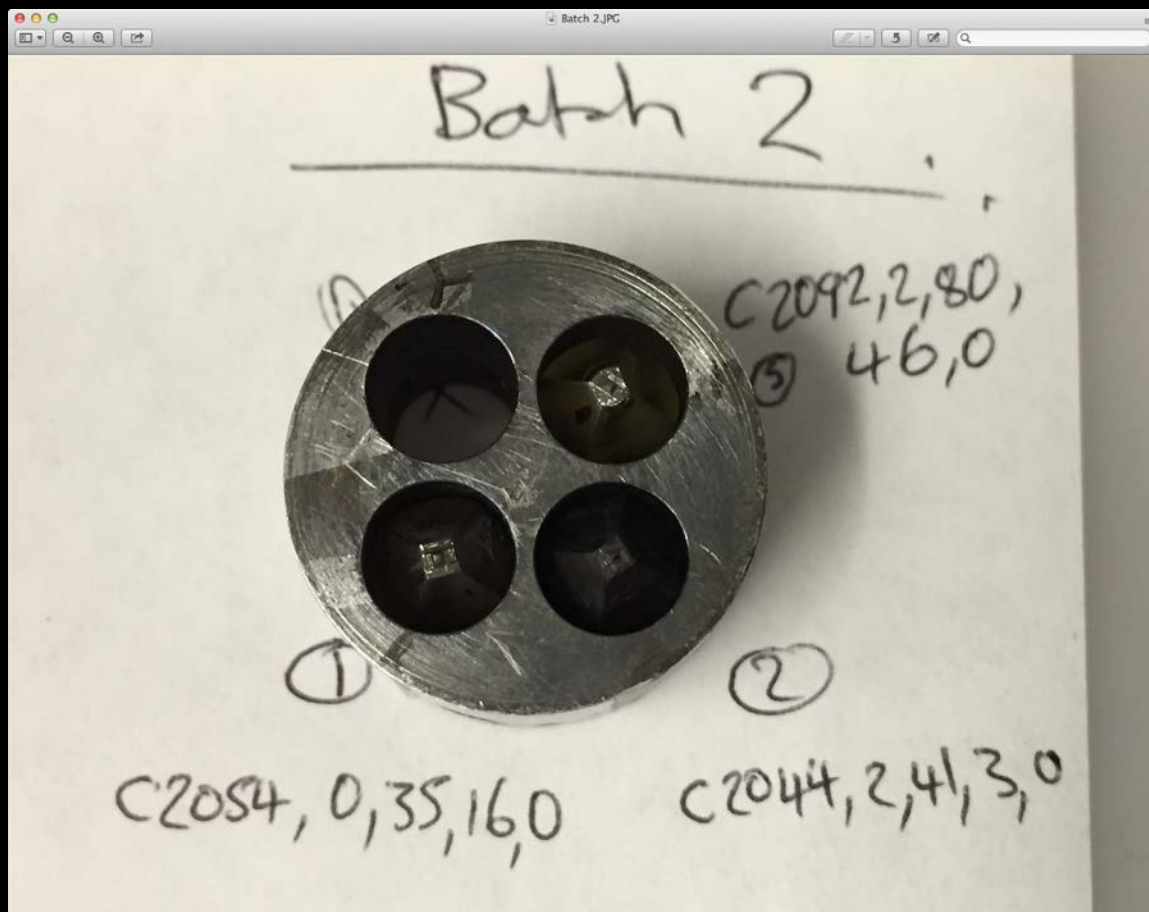
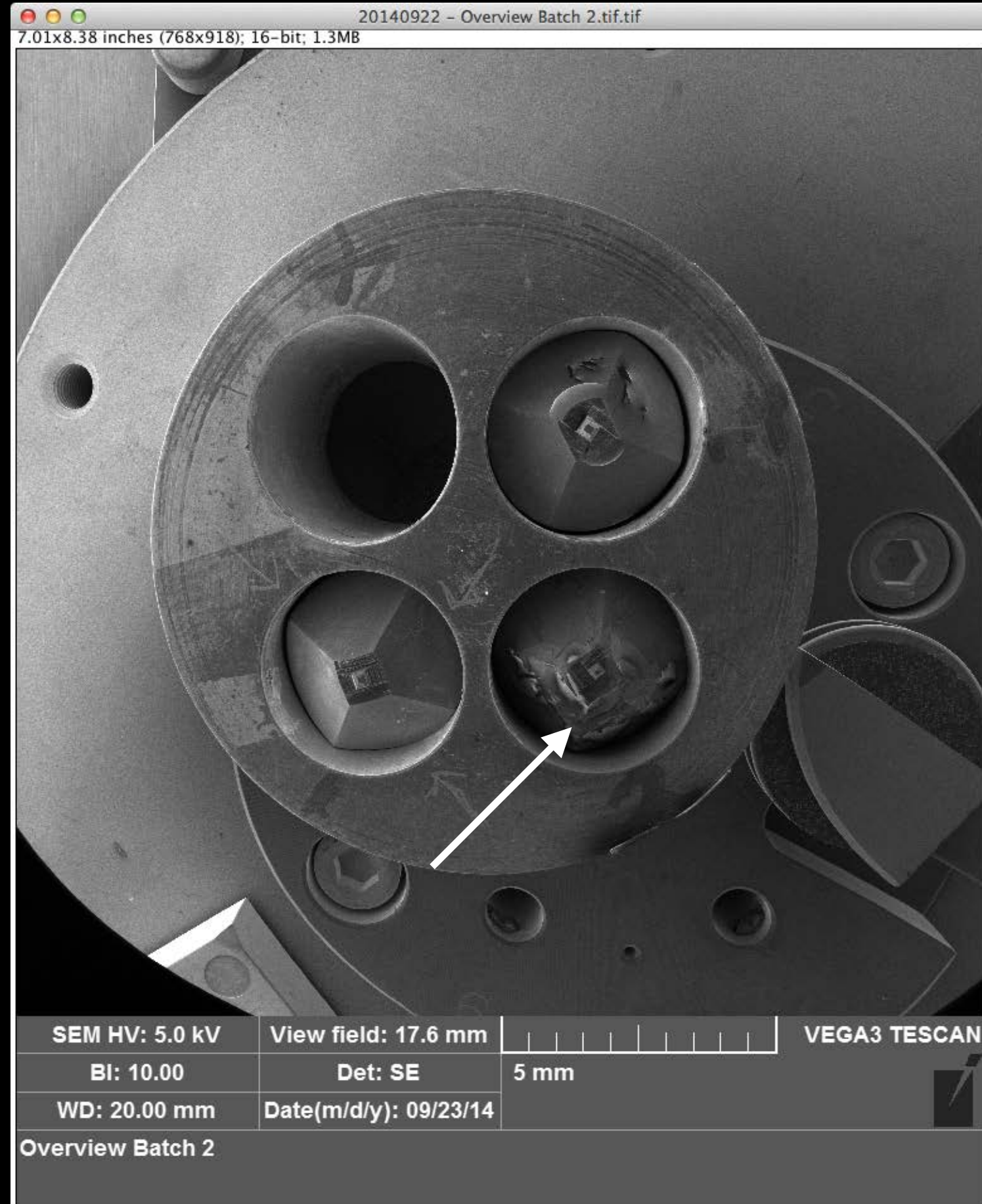
The carbon film is in bad shape.

C2054,0,35,16,0

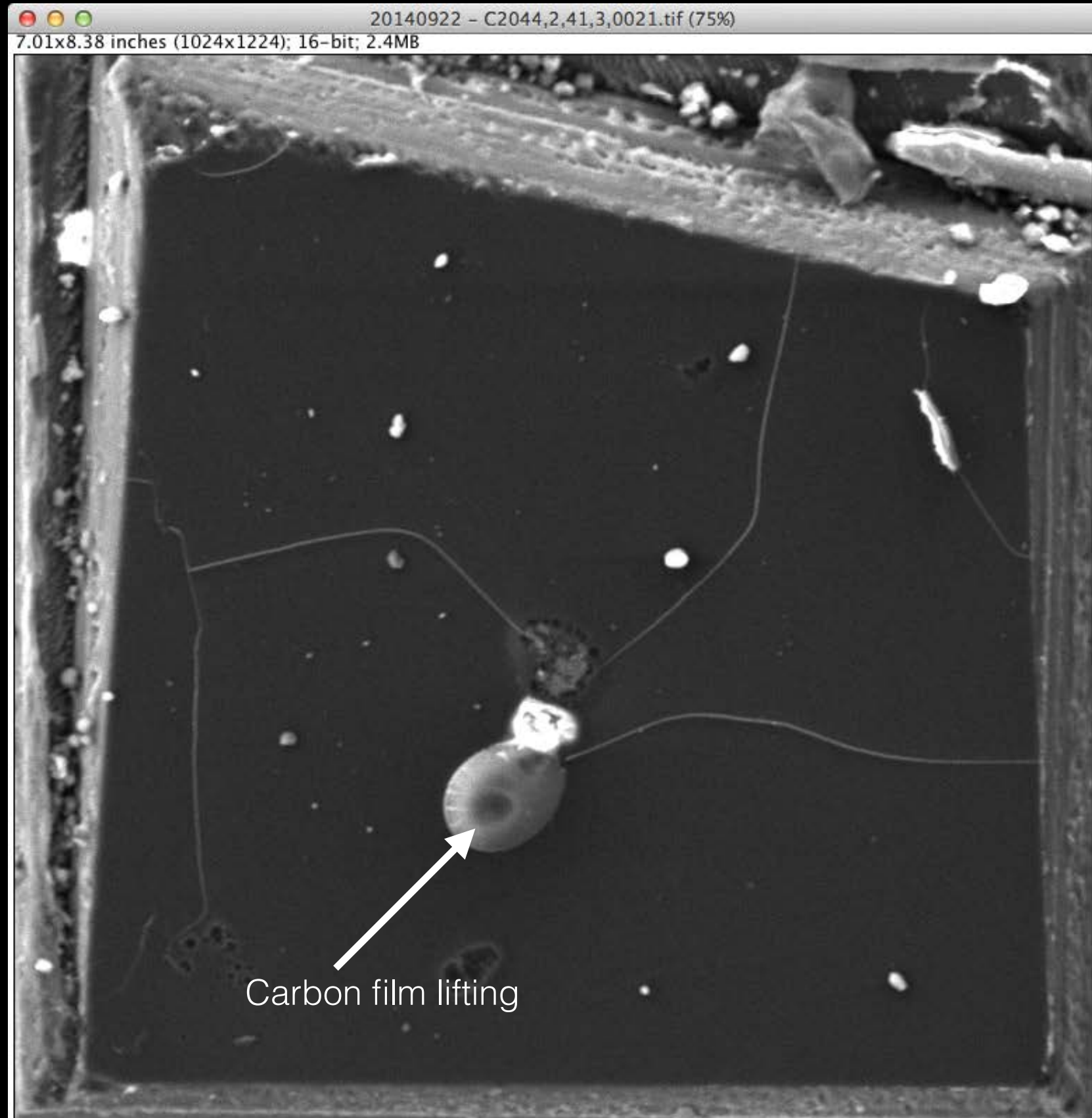
Quite a bit of topography here.
These little insulating balls are
about 5 microns tall...



Overview of second batch



C2044,2,41,3,0

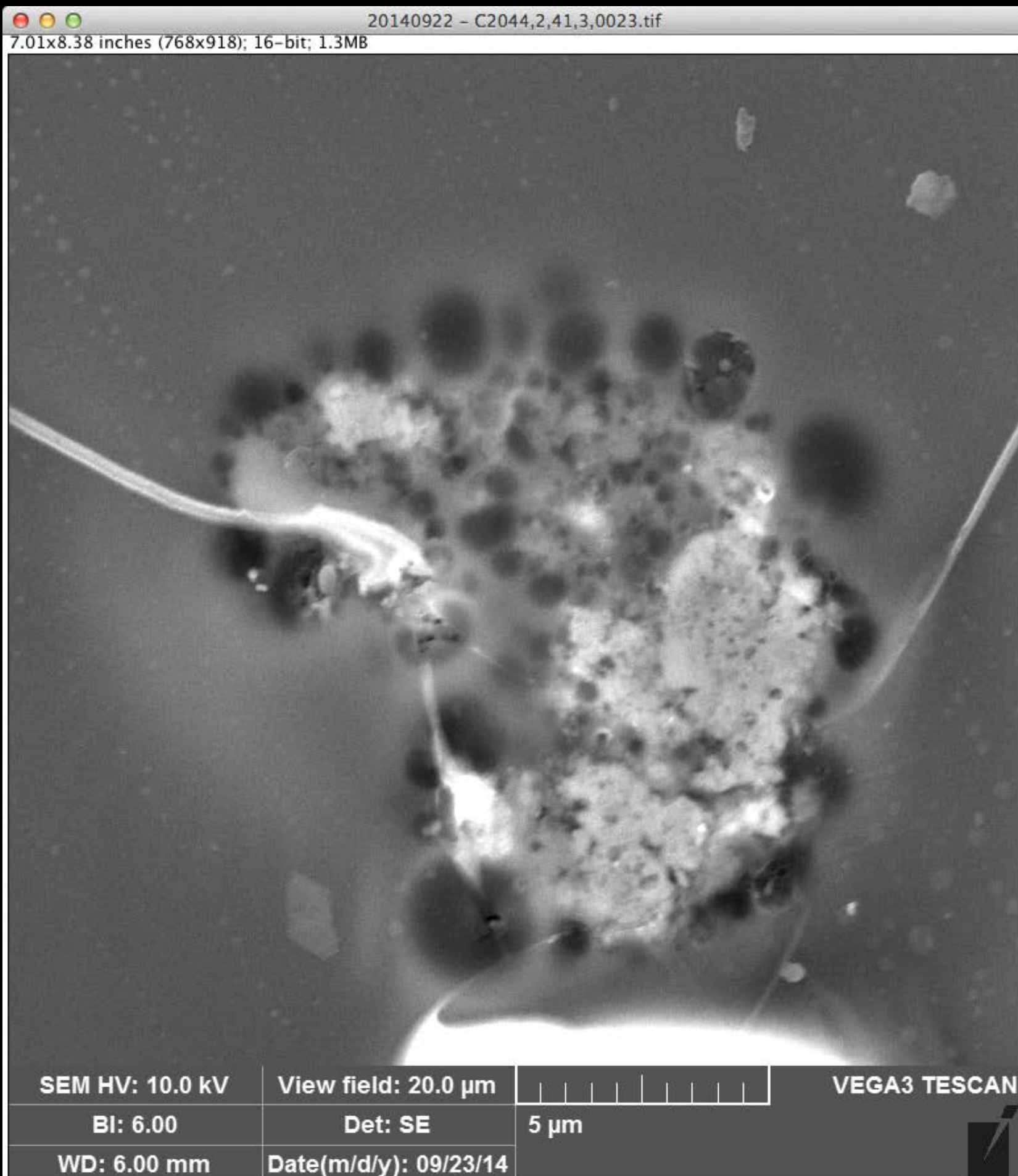


20140922 - C2044,2,41,3,0021.tif (75%)
7.01x8.38 inches (1024x1224); 16-bit; 2.4MB

Carbon film lifting

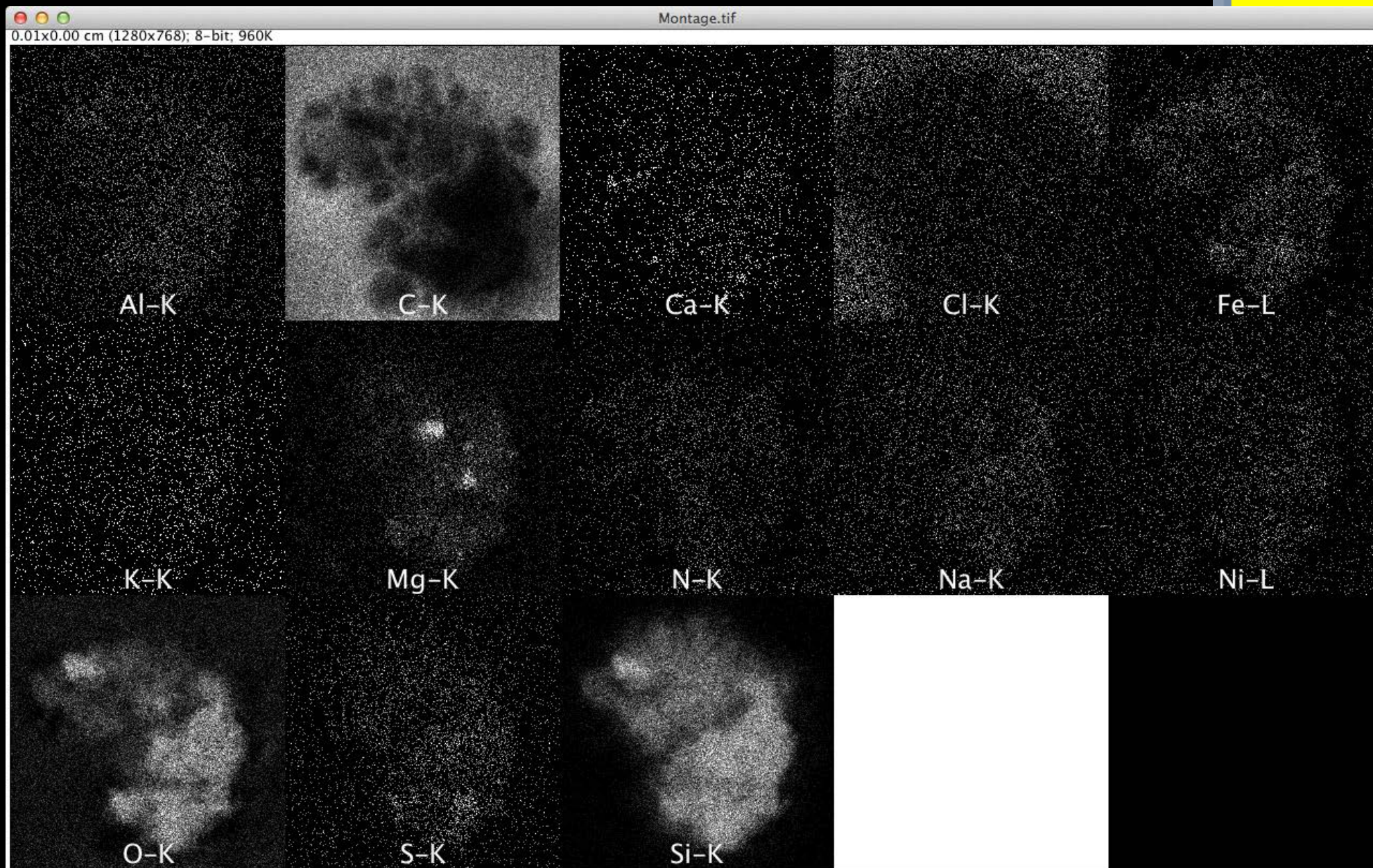
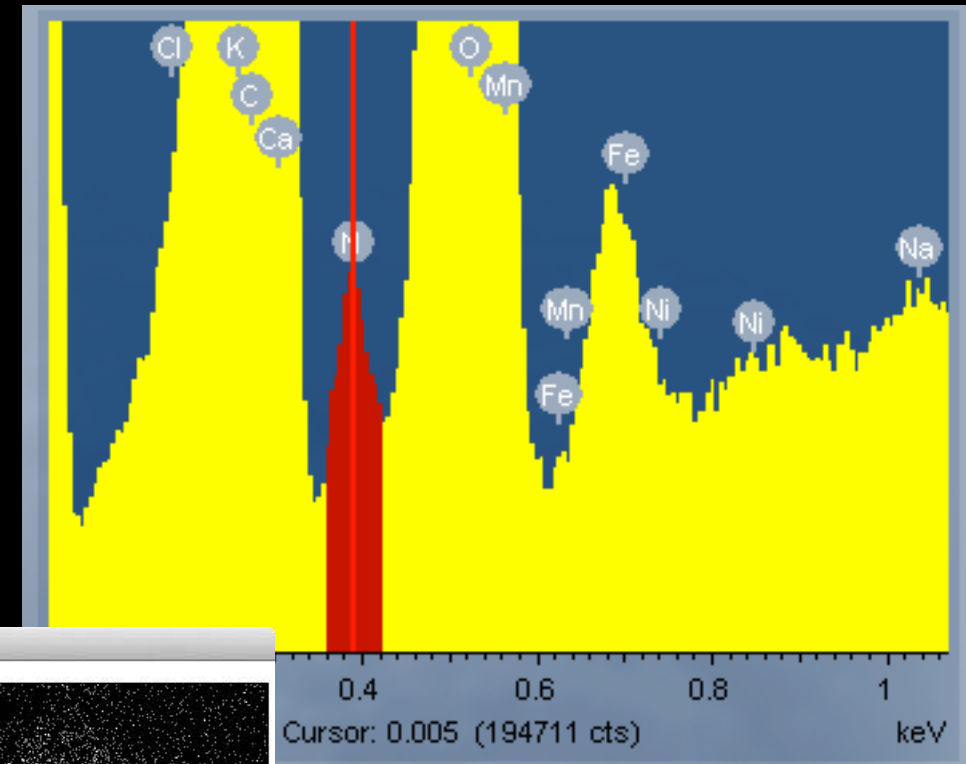
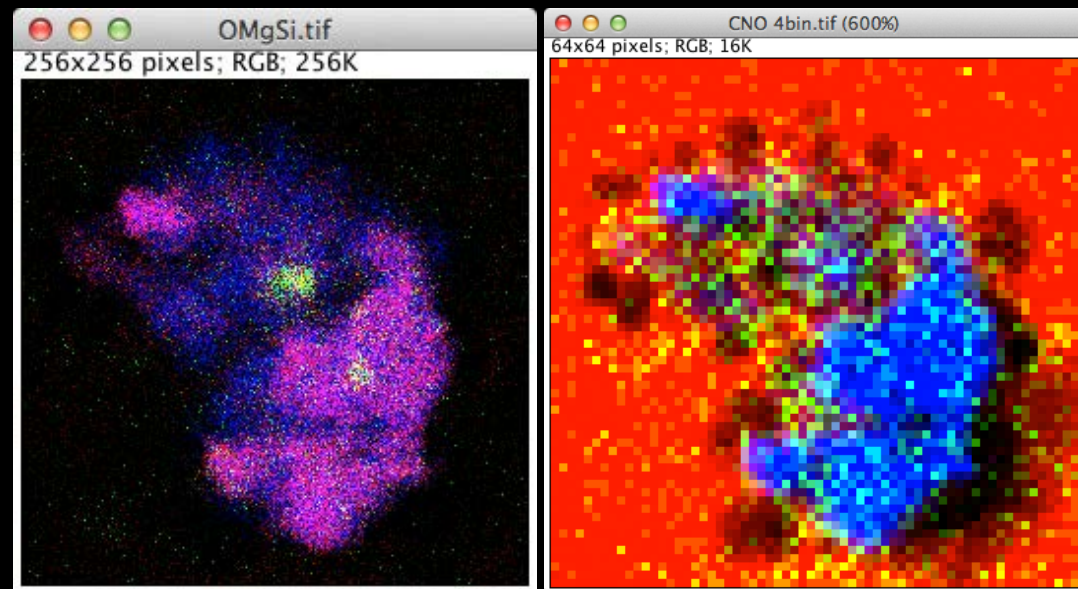
SEM HV: 10.0 kV	View field: 177 μ m	50 μ m	VEGA3 TESCAN
BI: 9.00	Det: SE		
WD: 12.44 mm	Date(m/d/y): 09/23/14		

C2044,2,41,3,0



This one looks more like a terminal particle. Check out the EDS maps.

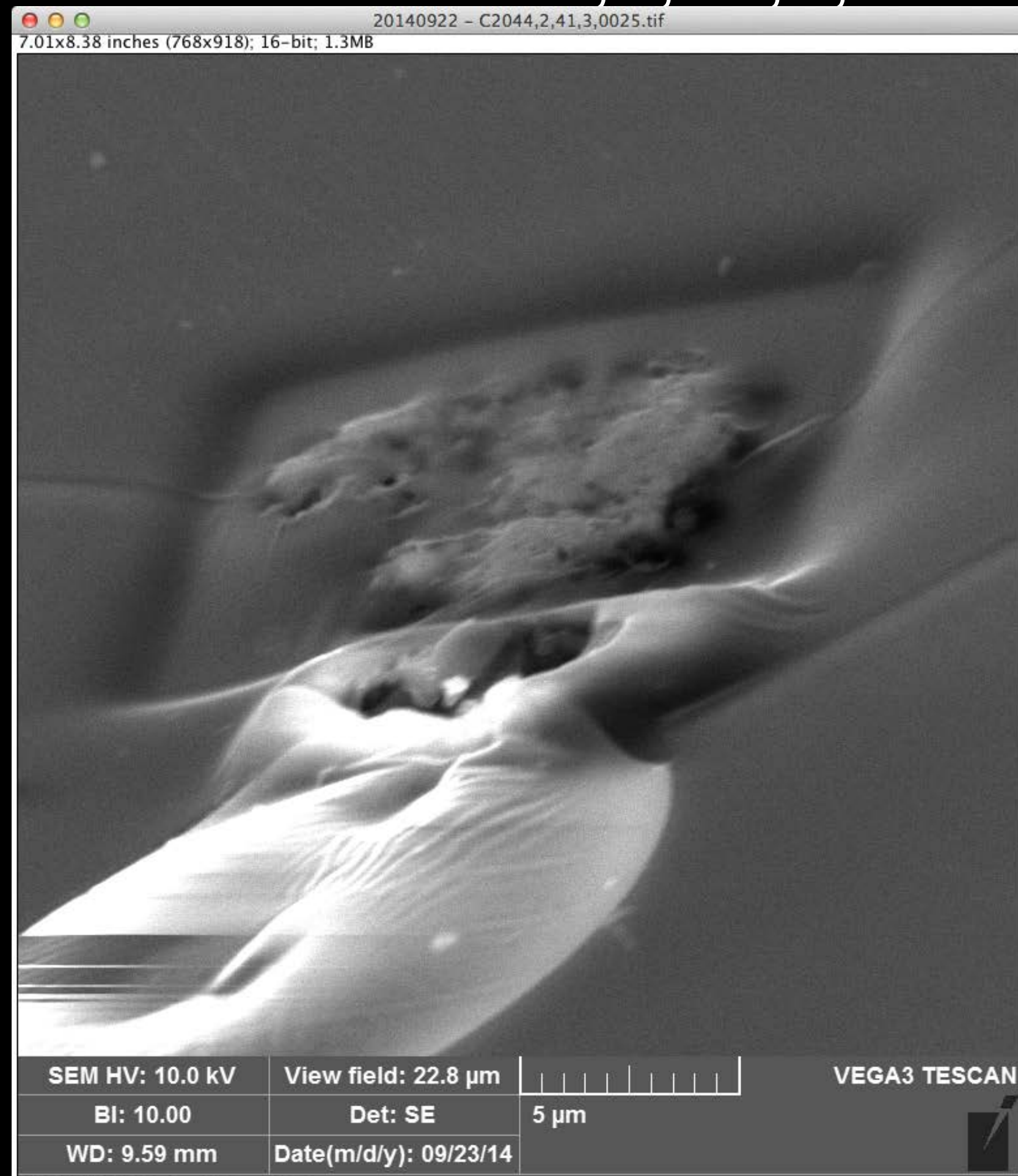
C2044,2,41,3,0



Notice the N is real! It is in the silicon rich portion

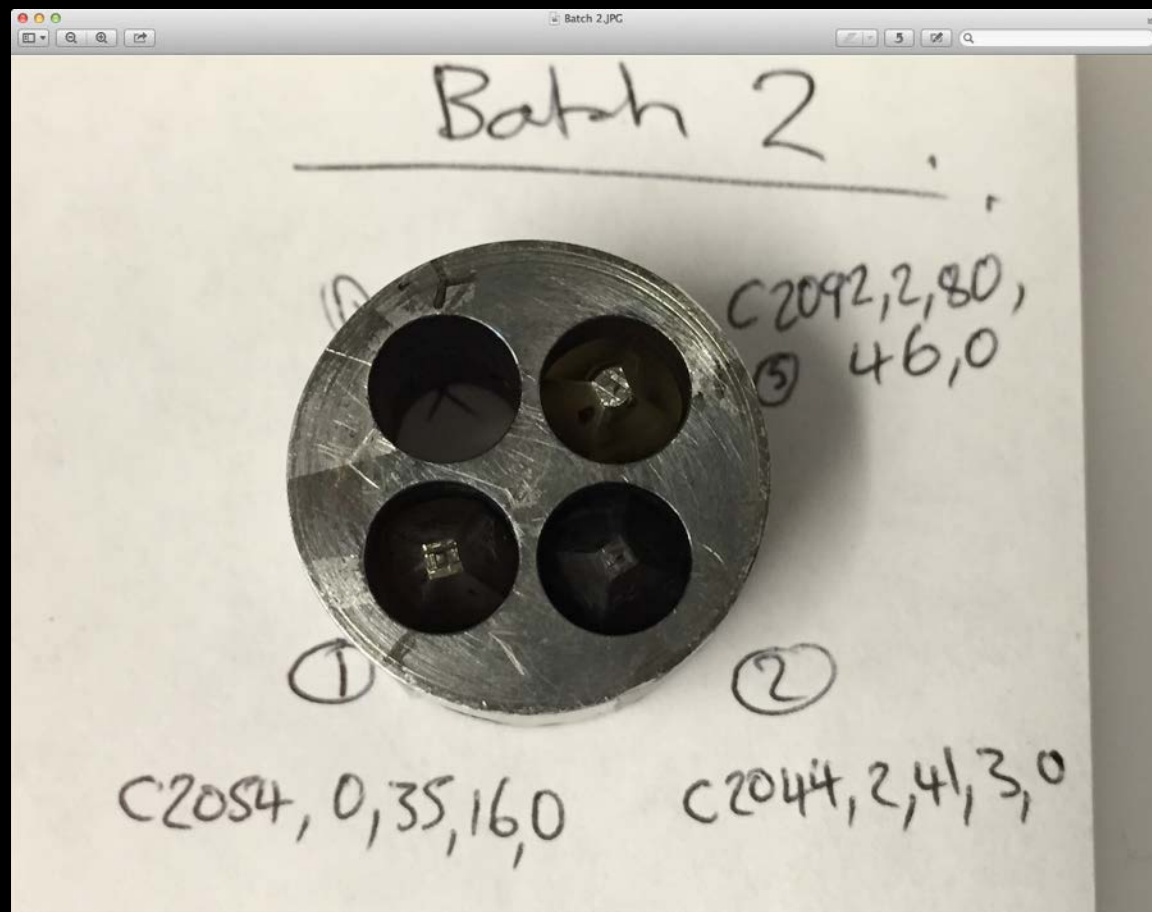
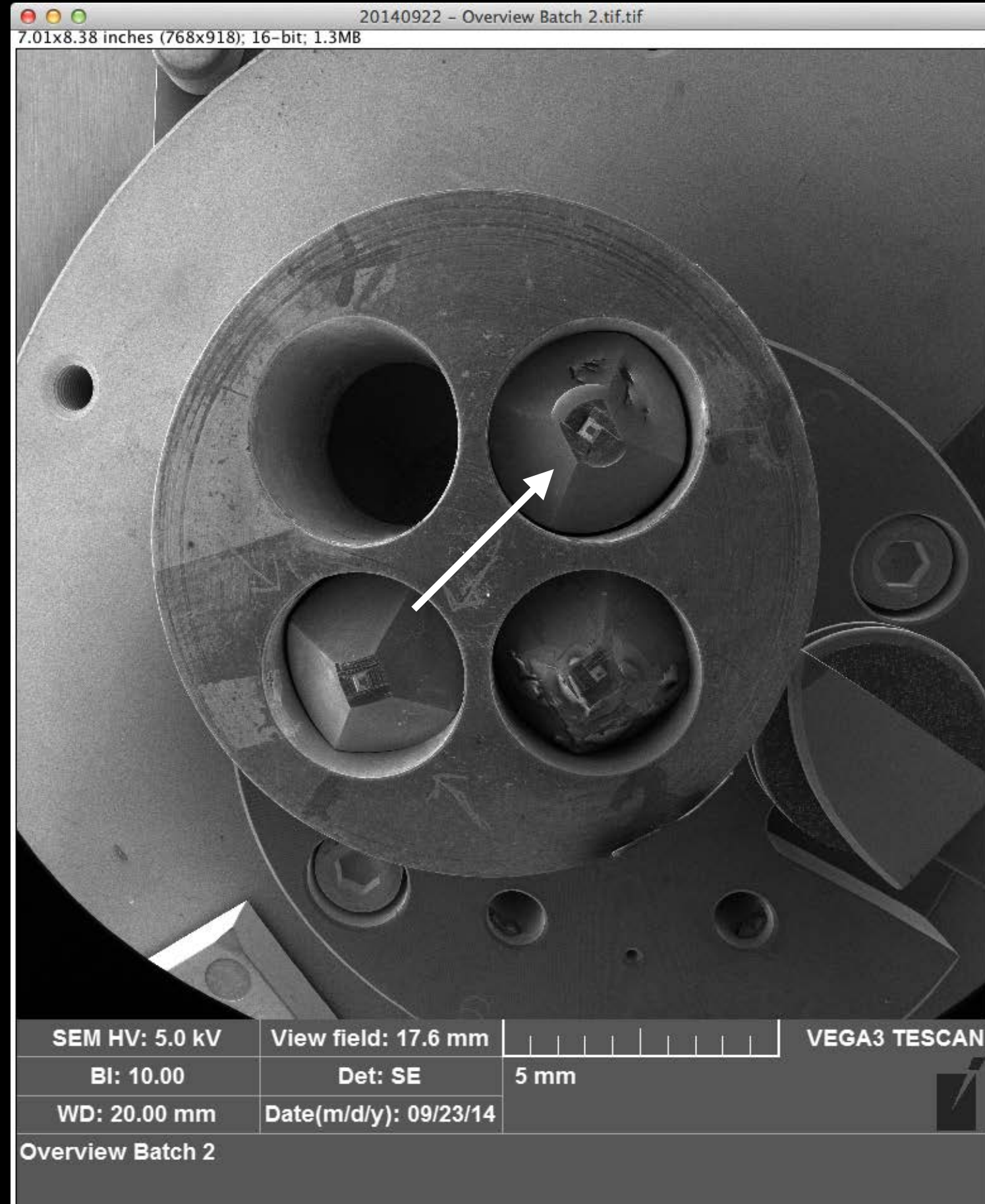
Wouldn't this be nice for NanoFTIR if only it weren't coated...

C2044,2,41,3,0 - After EDS



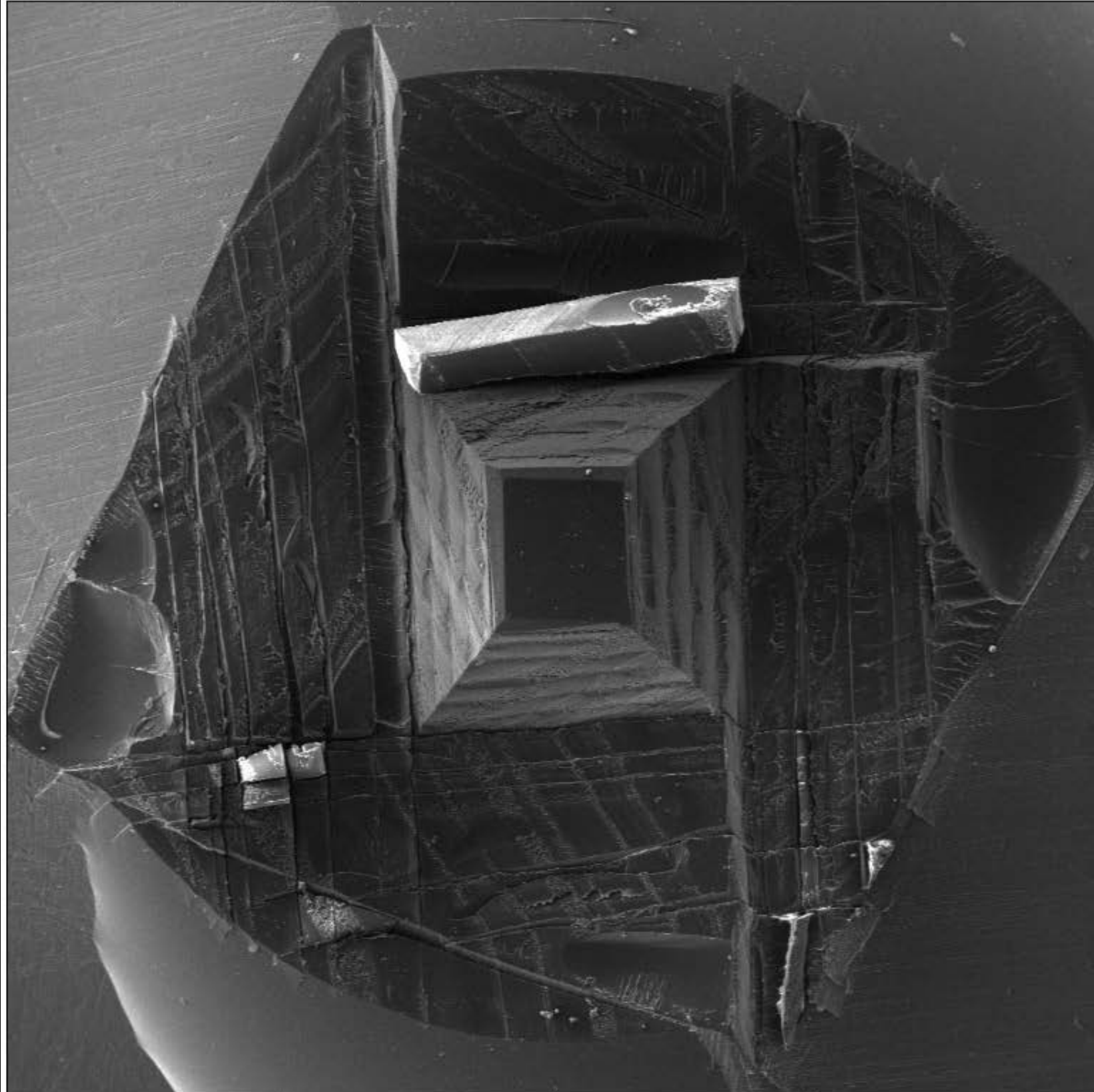
Estimated topography about a micron.

Overview of second batch



C2092,2,80,46,0

20140922 - C2092,2,80,46,0 - 026.tif (75%)
7.01x8.38 inches (1024x1224); 16-bit; 2.4MB



SEM HV: 10.0 kV

View field: 2.15 mm

VEGA3 TESCAN

BI: 11.00

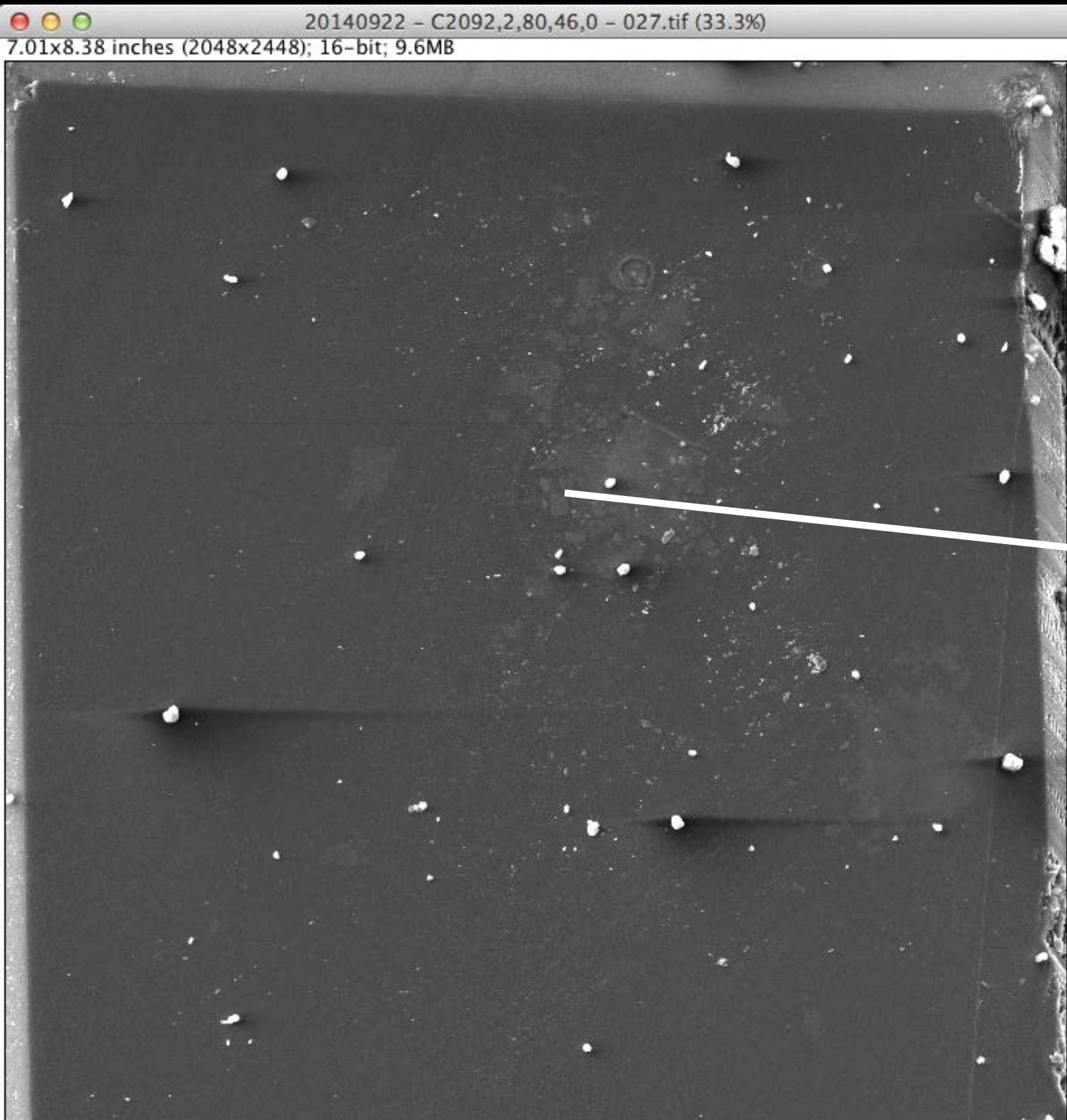
Det: SE

500 μ m

WD: 29.70 mm

Date(m/d/y): 09/23/14

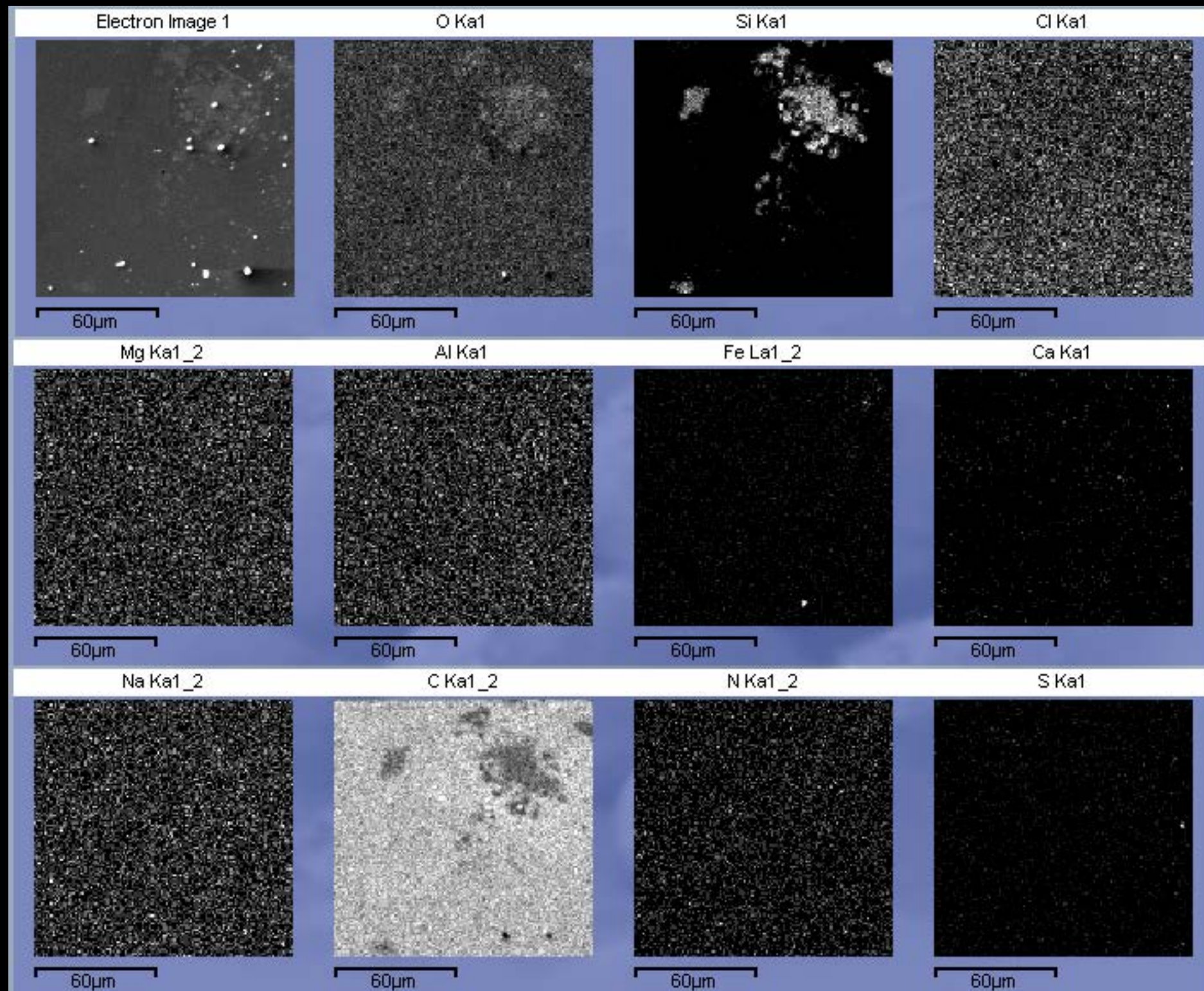
C2092,2,80,46,0



So I guess this is all aerogel. Not so clear that it is actually track material though.



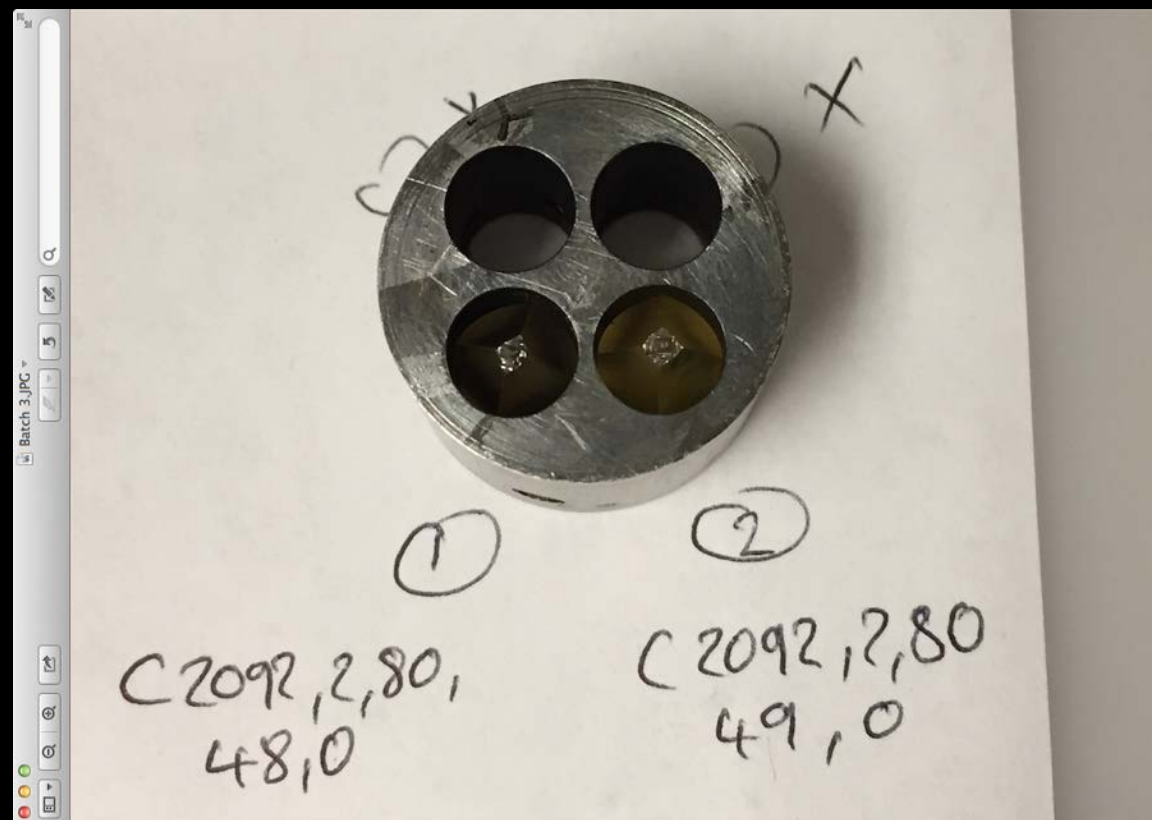
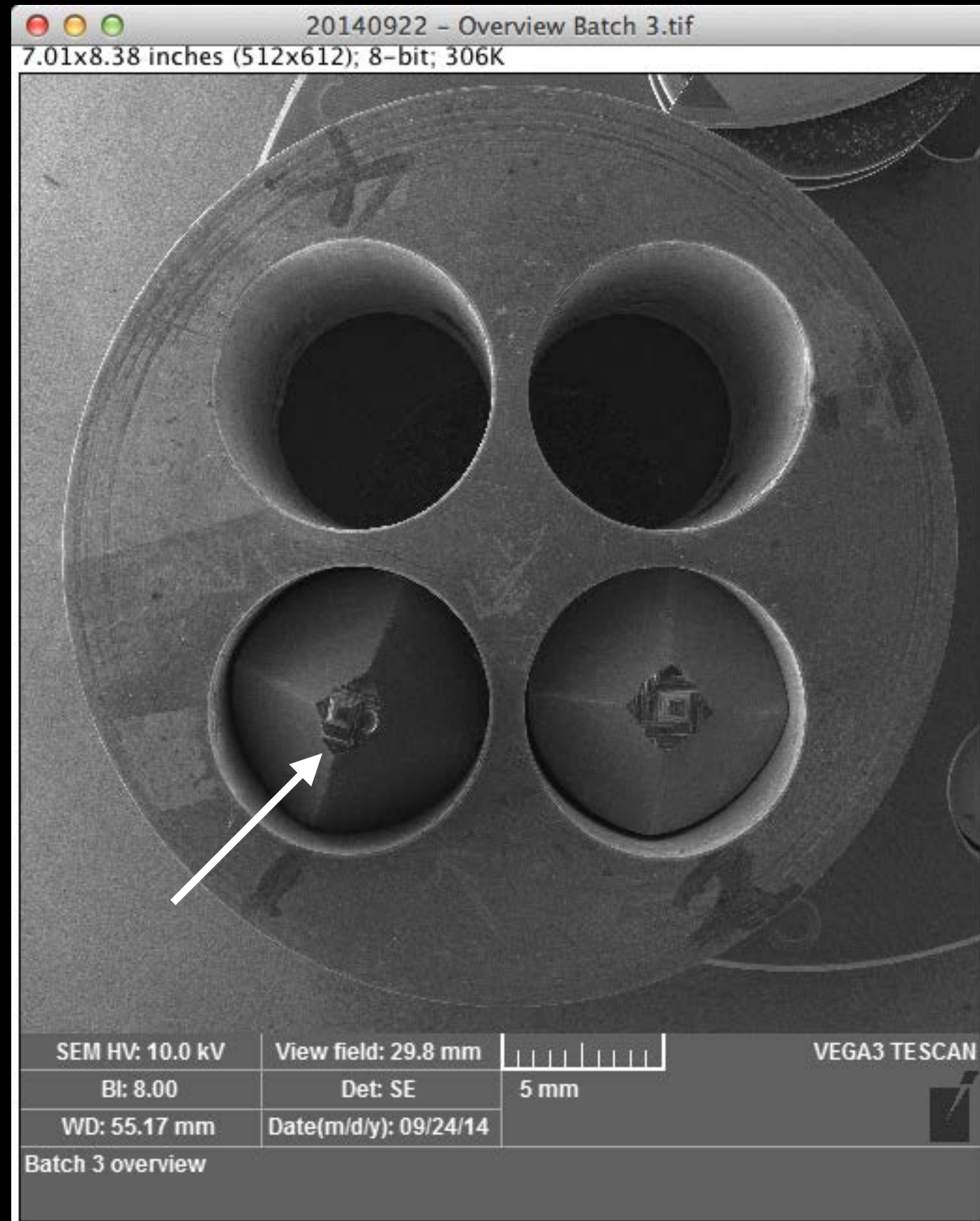
C2092,2,80,46,0 - EDS



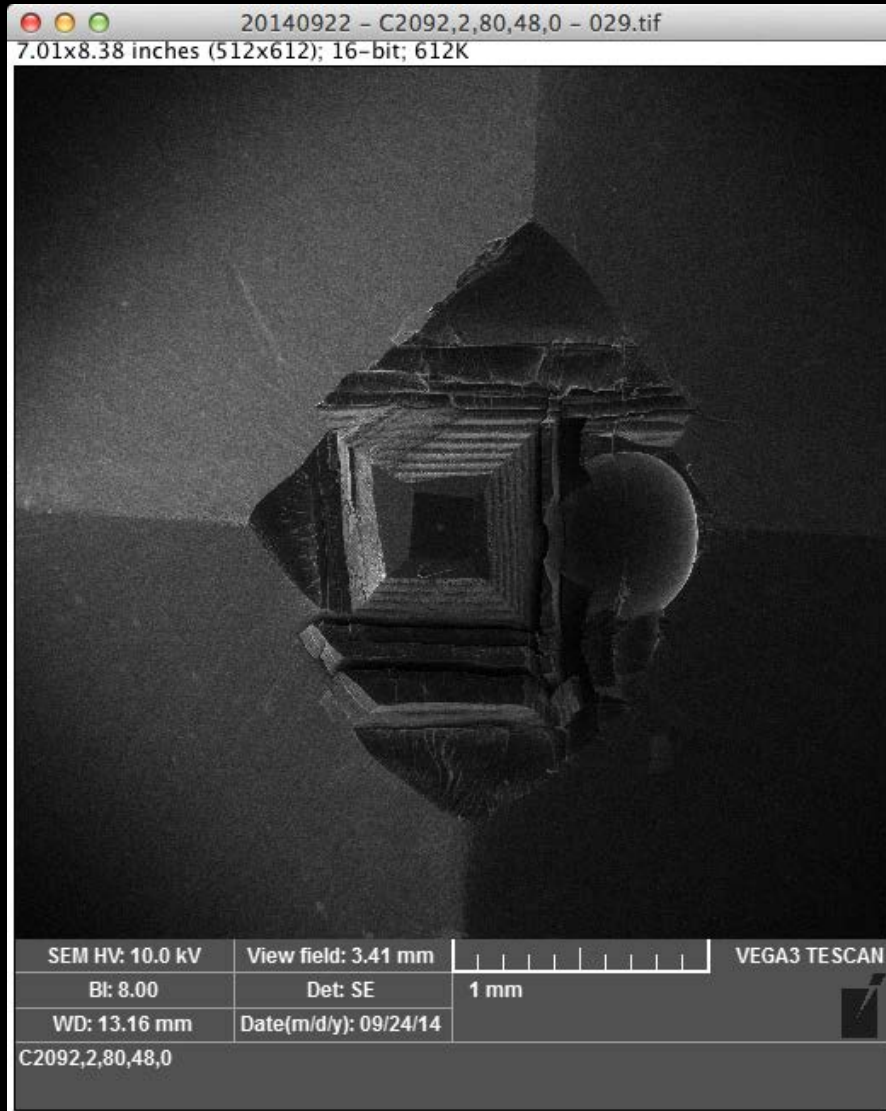
See? O and Si rich, C poor.

There is sure lots of gunk on the surface though.

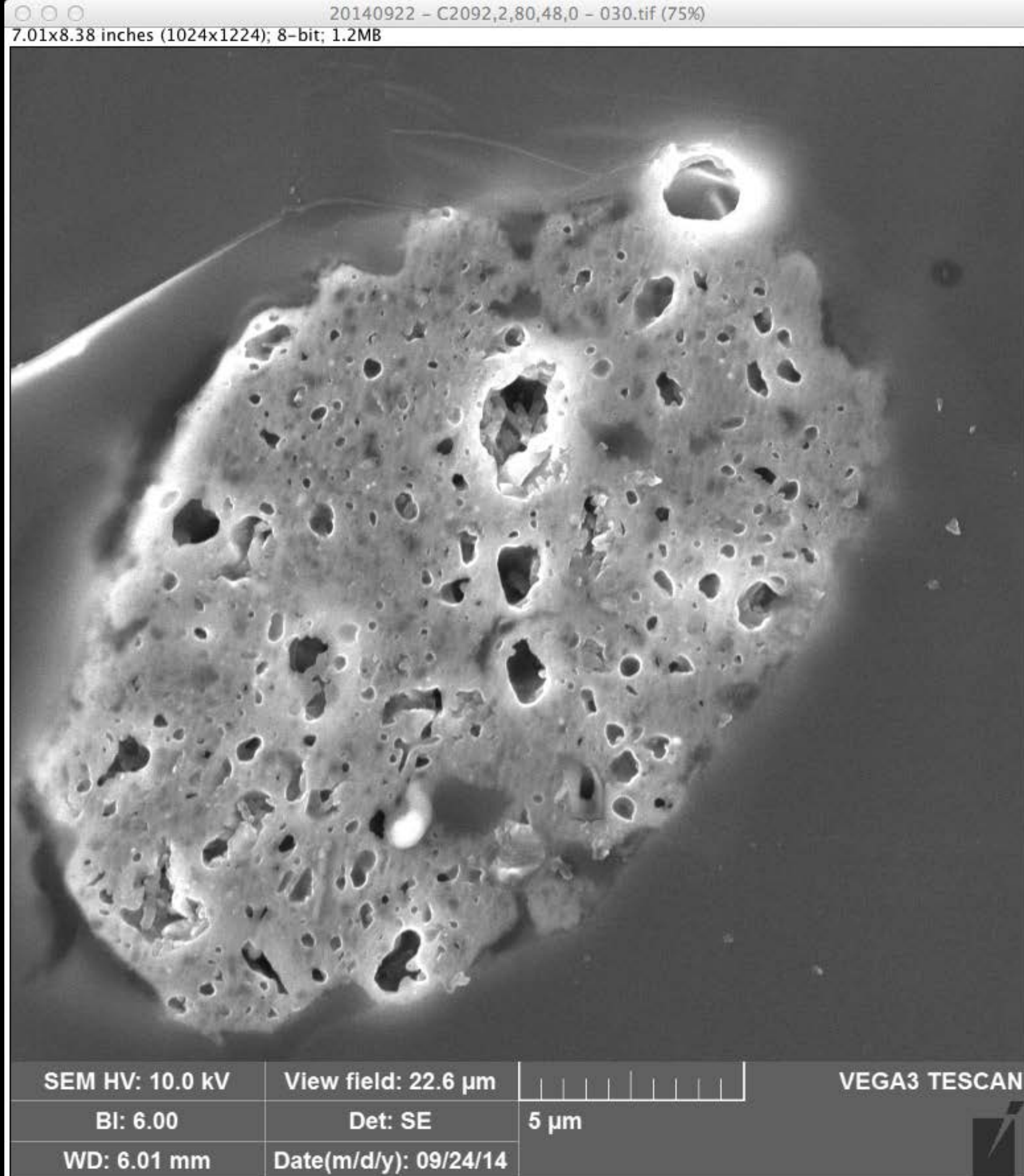
Overview of third batch



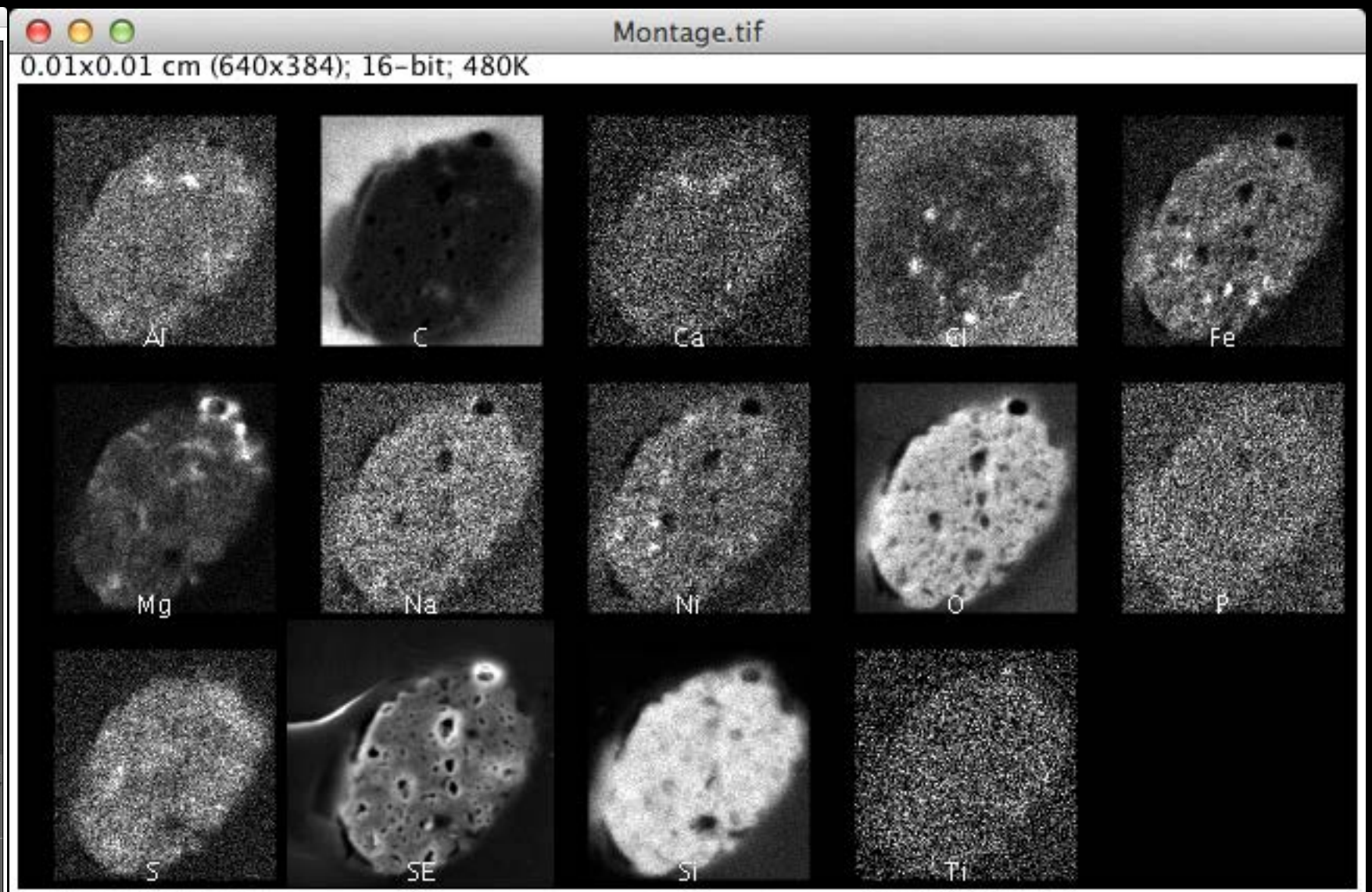
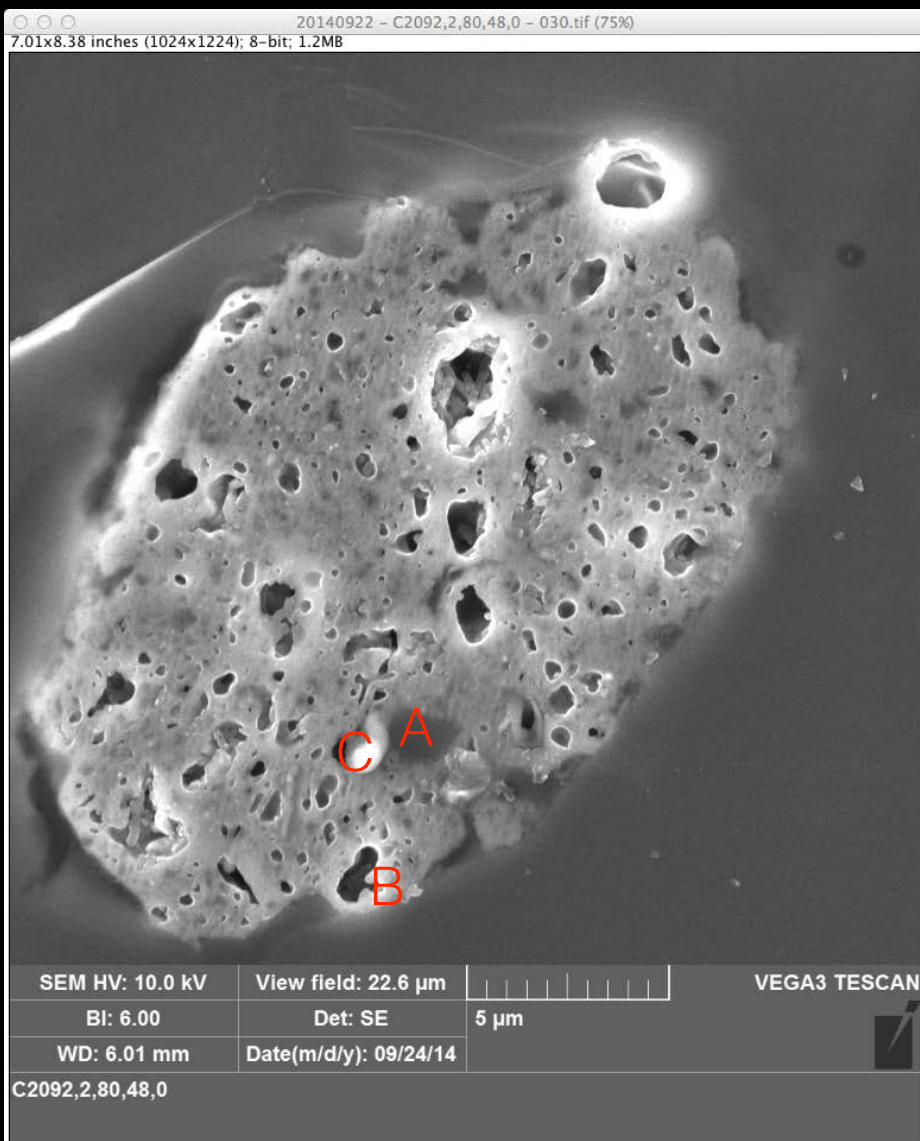
C2092,2,80,48,0



Well, well! That's a beaut!



C2092,2,80,48,0 - EDS

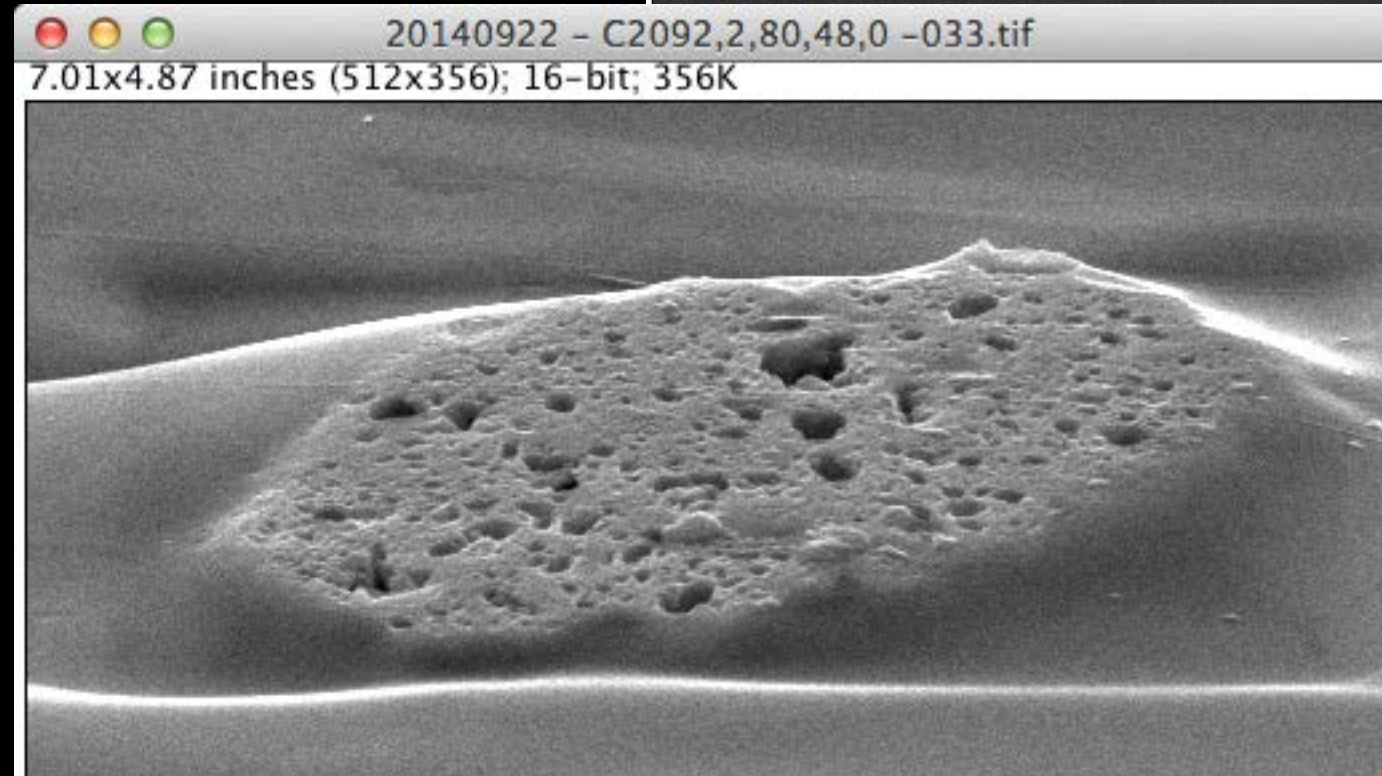
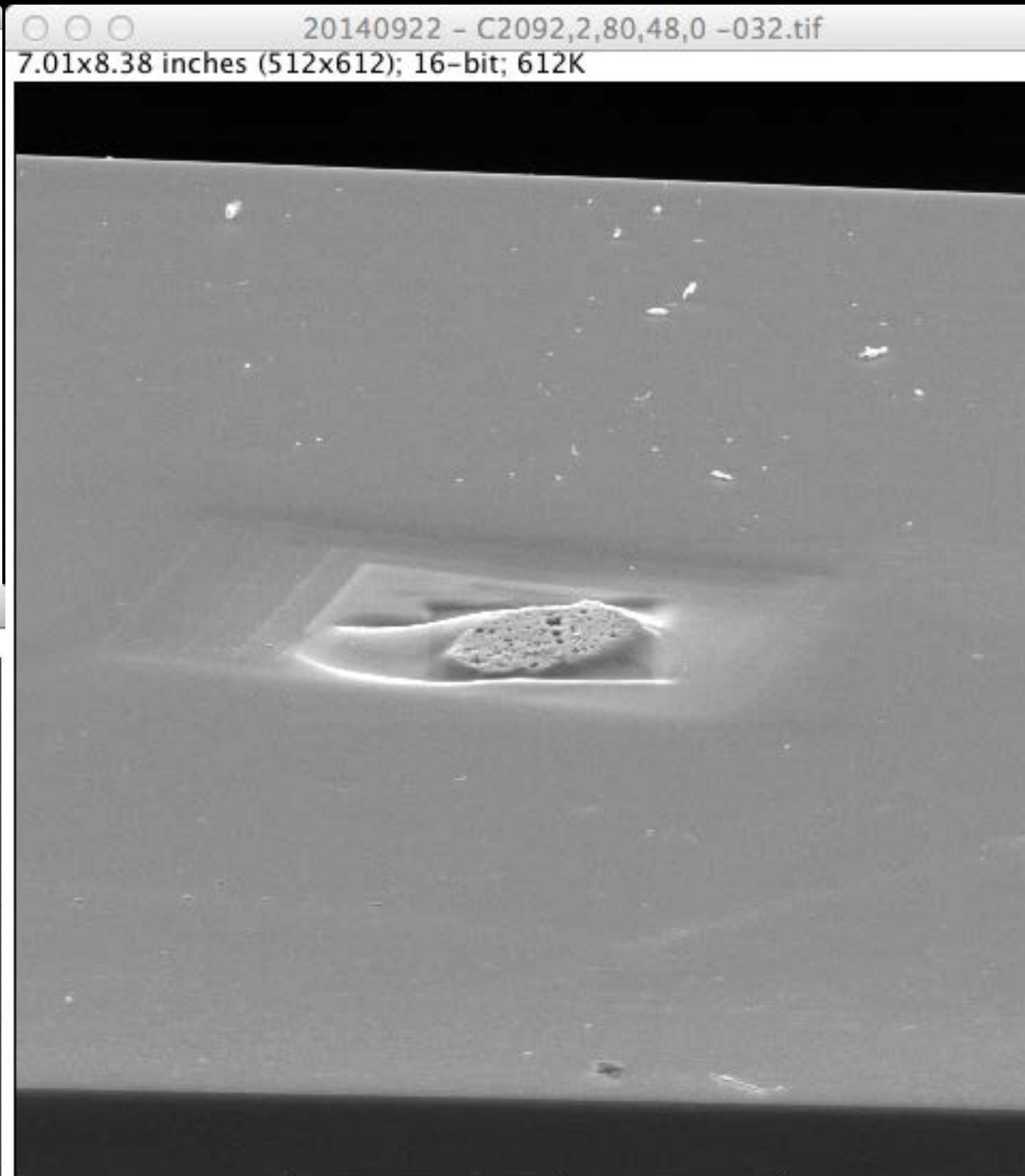
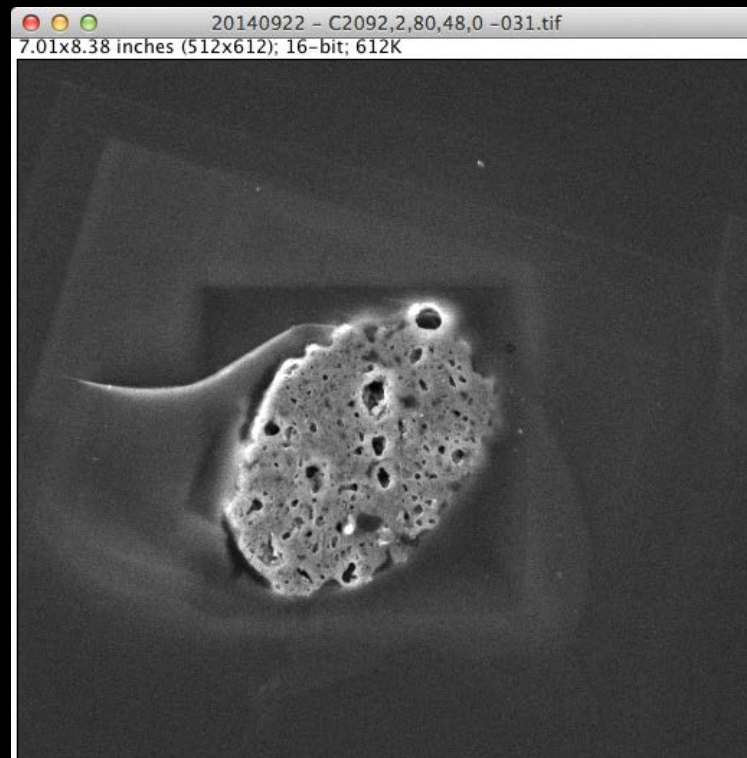


Notice the Cl hotspots. I don't think they are just a straightforward incorporation of epoxy because look at A vs B. A is looking like a little island of epoxy that impregnated the blob. However, B has an even higher Cl concentration which means either:

- 1) Cl was concentrated in the original impactor
- 2) Chemistry occurred between the epoxy and that portion which produced more epoxy cross-linking.

Now notice C. It is Fe rich. It is probably a grain — not just a shadow grain. It shows a well defined boundary in the SE image. There are some others to be seen around too — little bright spots mostly. The impregnation of epoxy throughout the center of this object show it was really fluffy. It would be neat to see how much OH there is in that glass.

C2092,2,80,48,0 - after EDS



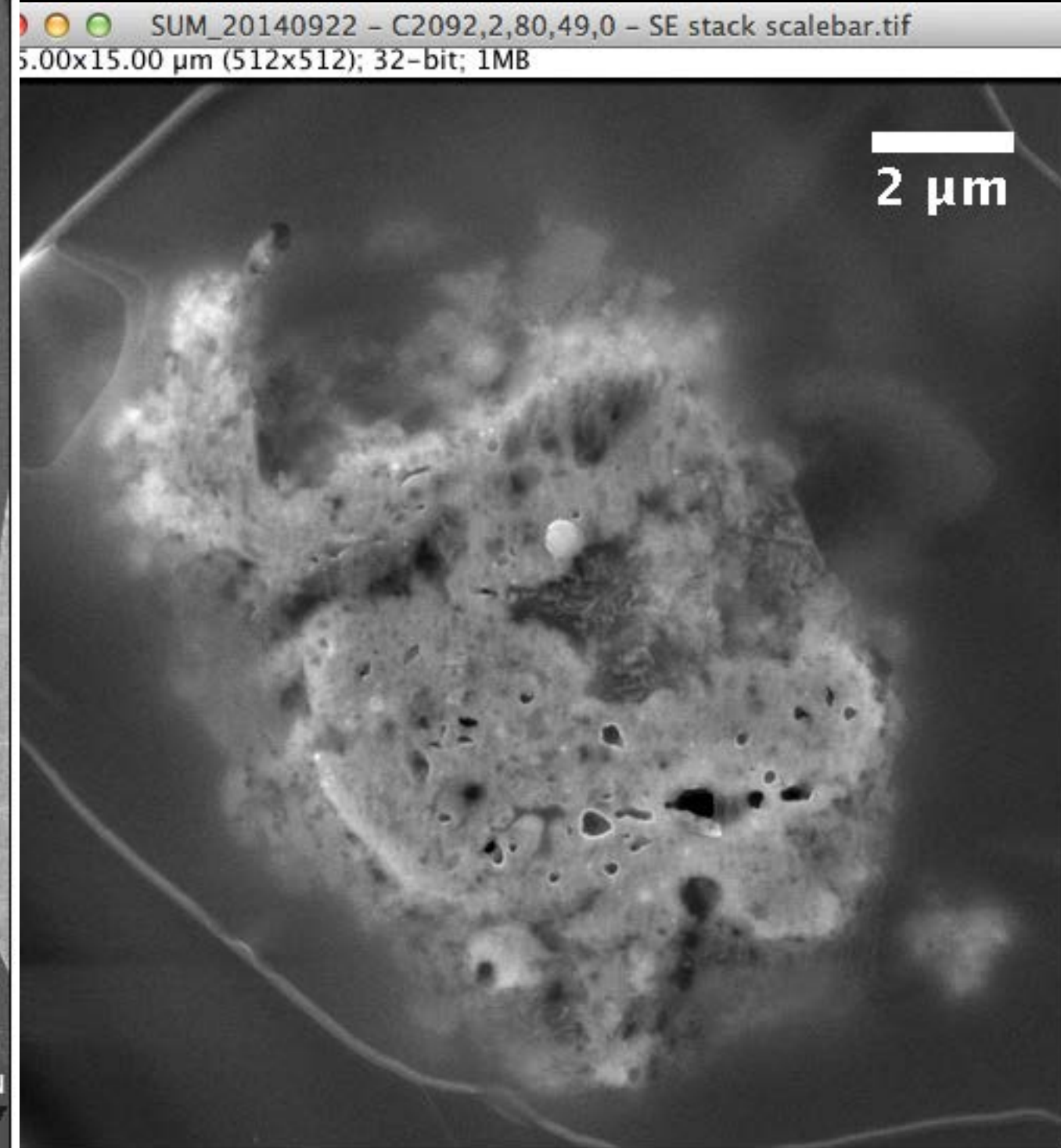
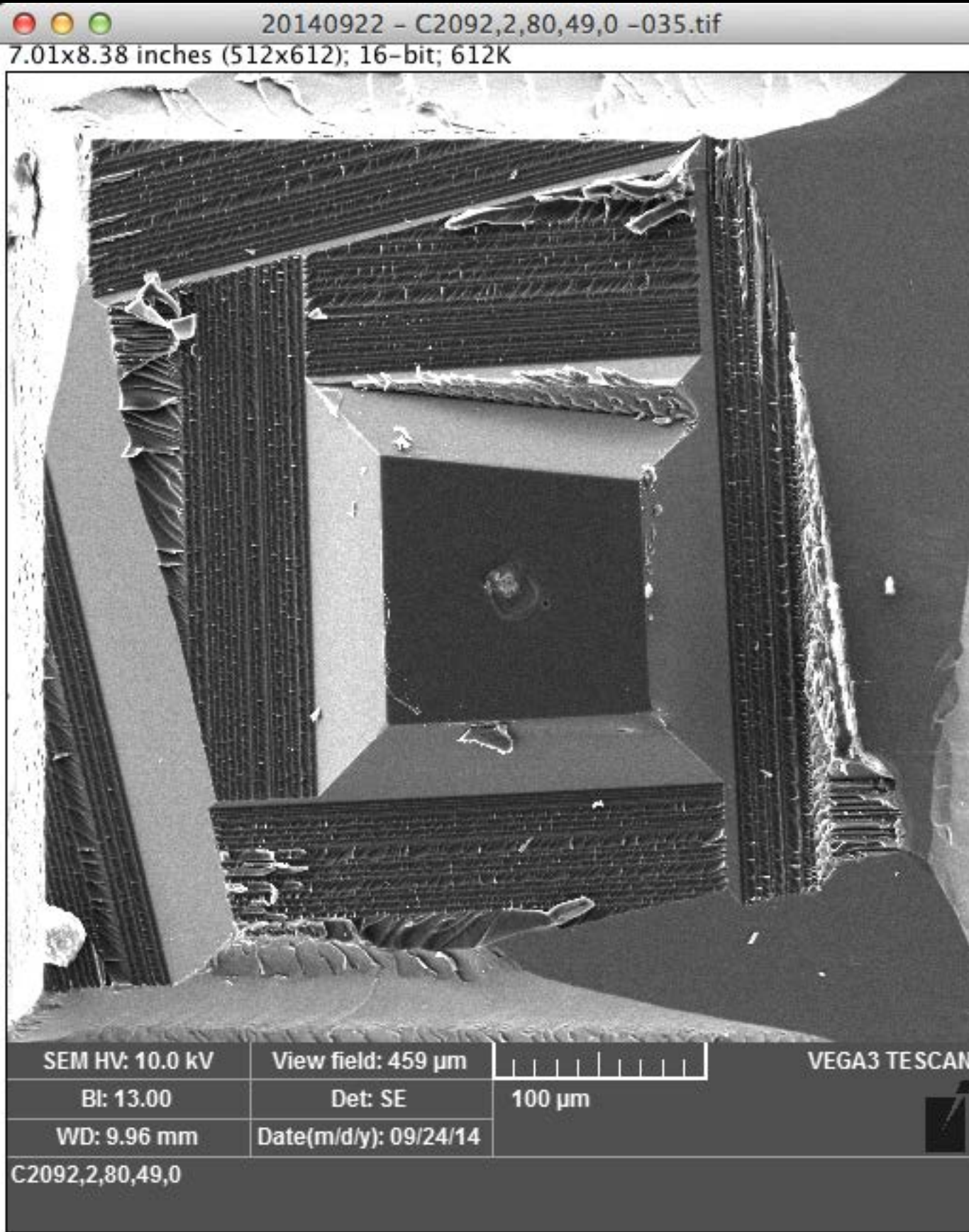
SEM HV: 10.0 kV	View field: 103 μ m		VEGA3 TESCAN
Bl: 7.00	Det: SE	20 μ m	
WD: 10.00 mm	Date(m/d/y): 09/24/14		

C2092,2,80,48,0 after EDS

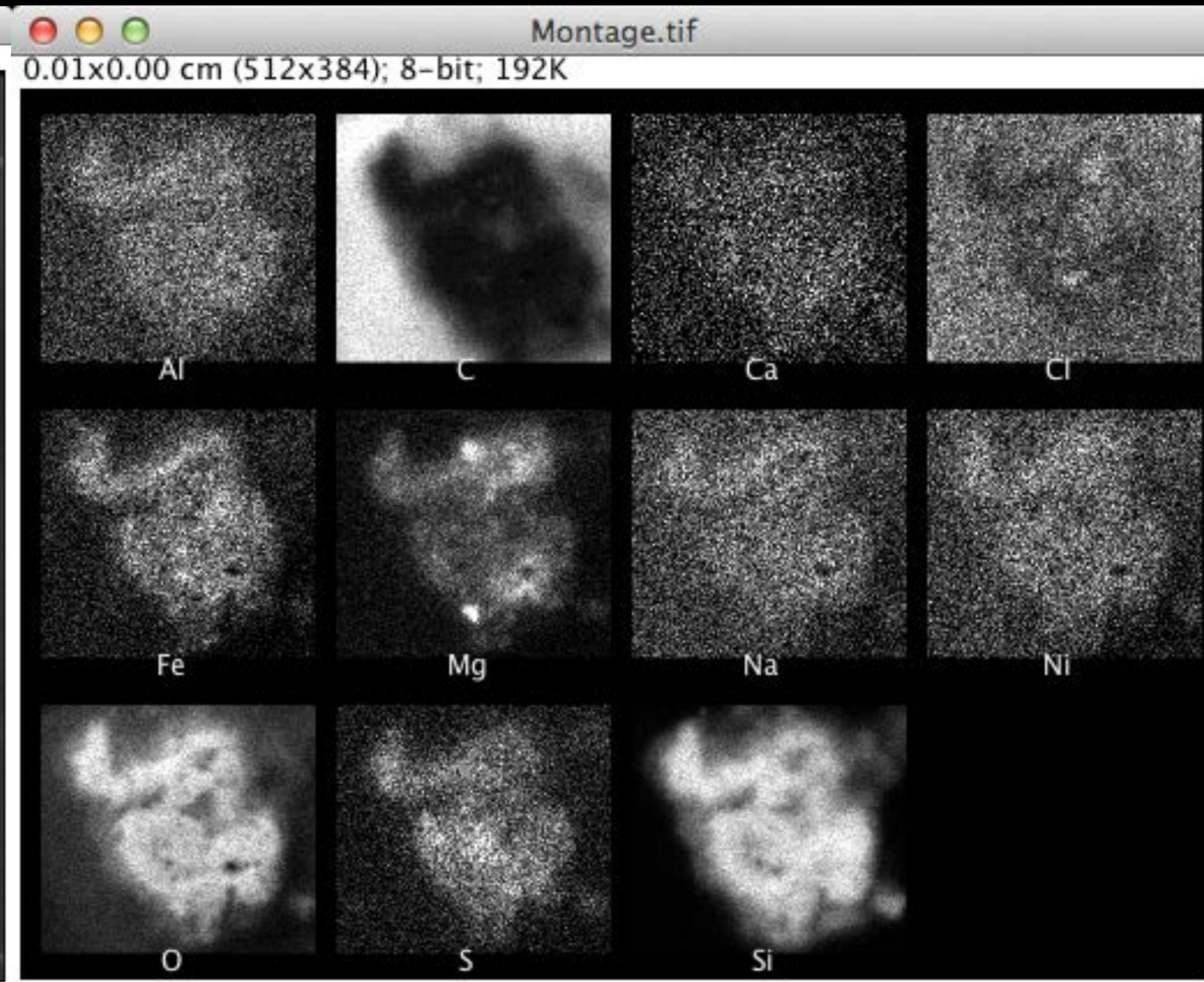
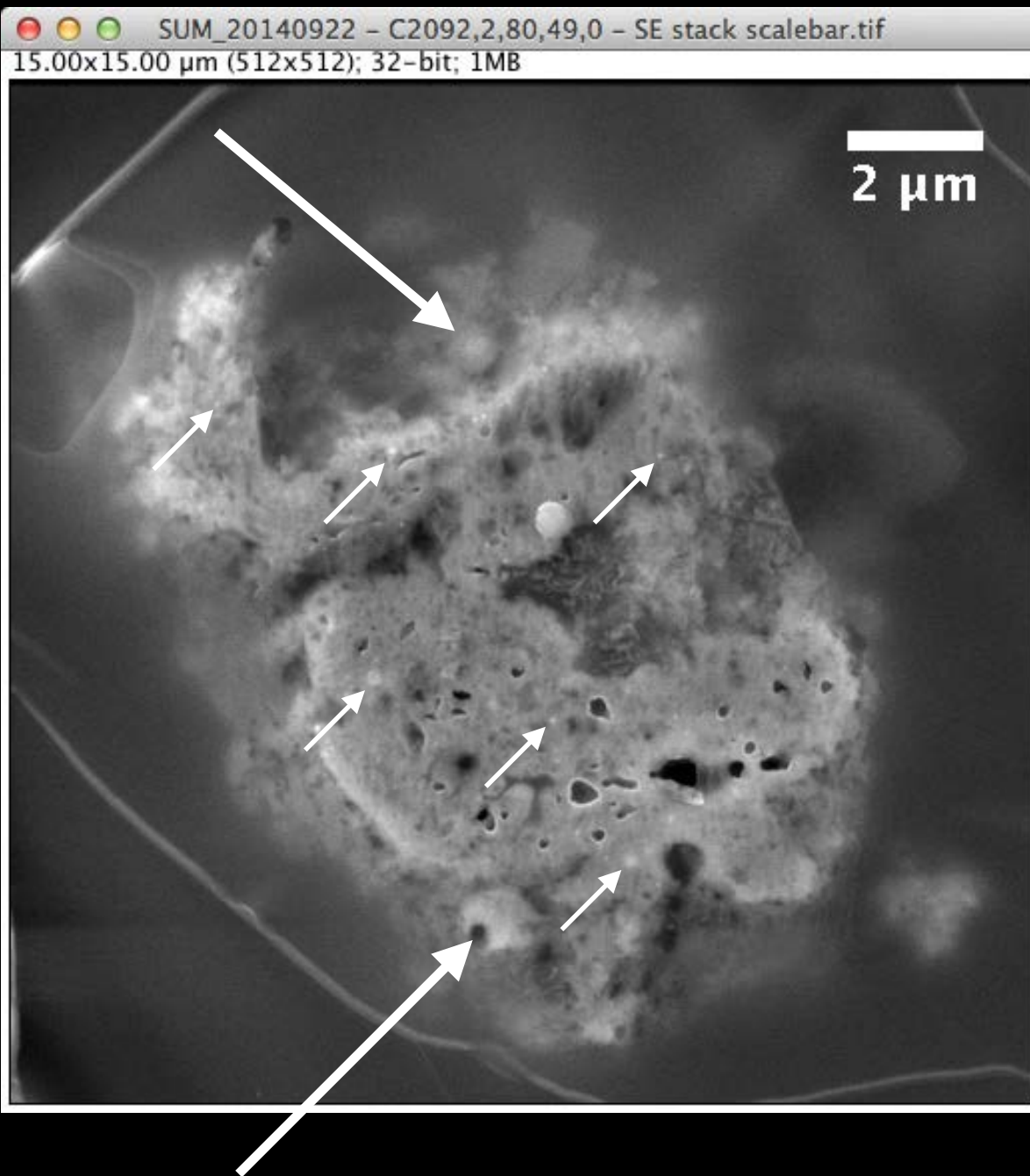
SEM HV: 10.0 kV	View field: 23.6 μ m		VEGA3 TESCAN
Bl: 7.00	Det: SE	5 μ m	
WD: 9.99 mm	Date(m/d/y): 09/24/14		

C2092,2,80,48,0 after EDS

C2092,2,80,49,0



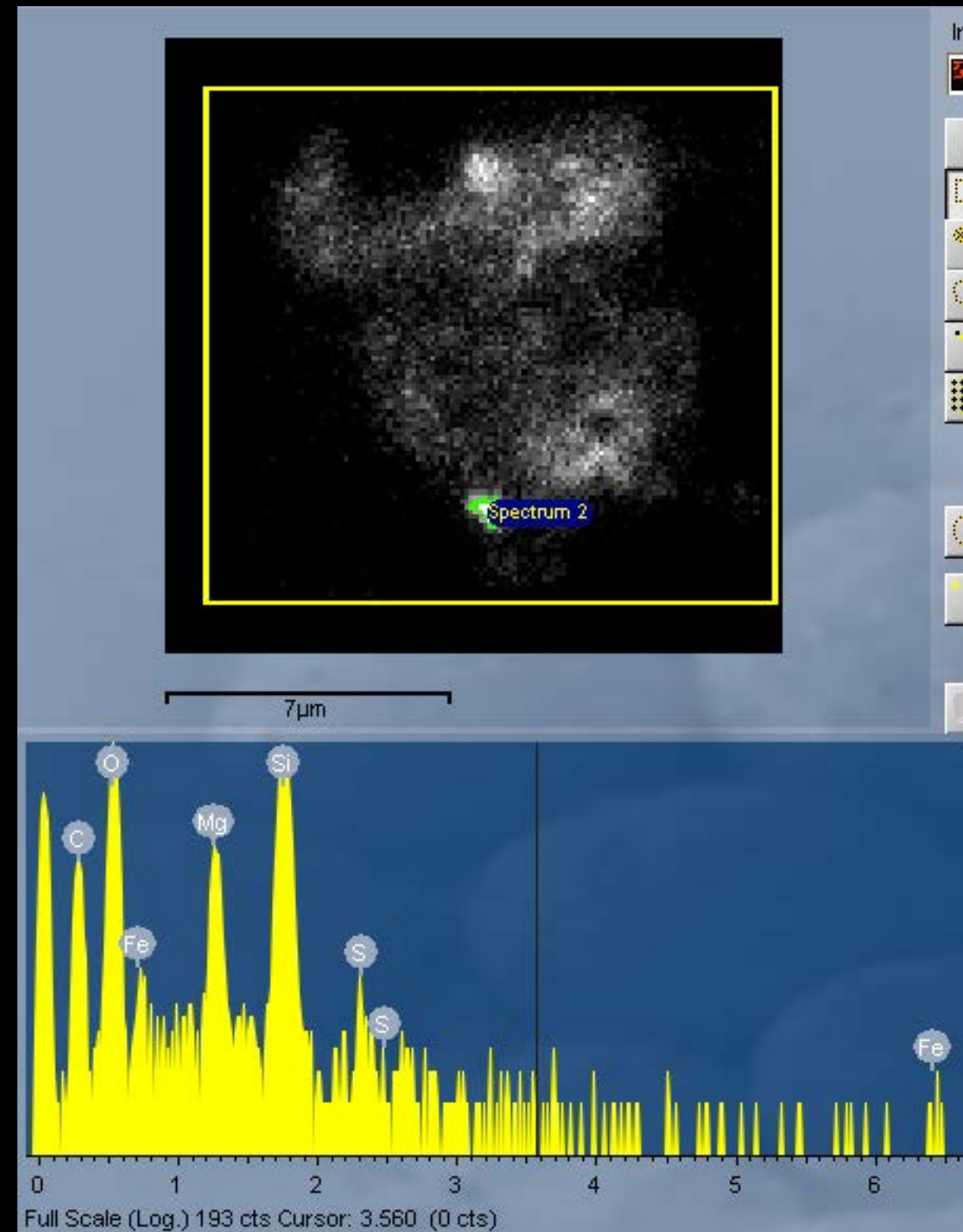
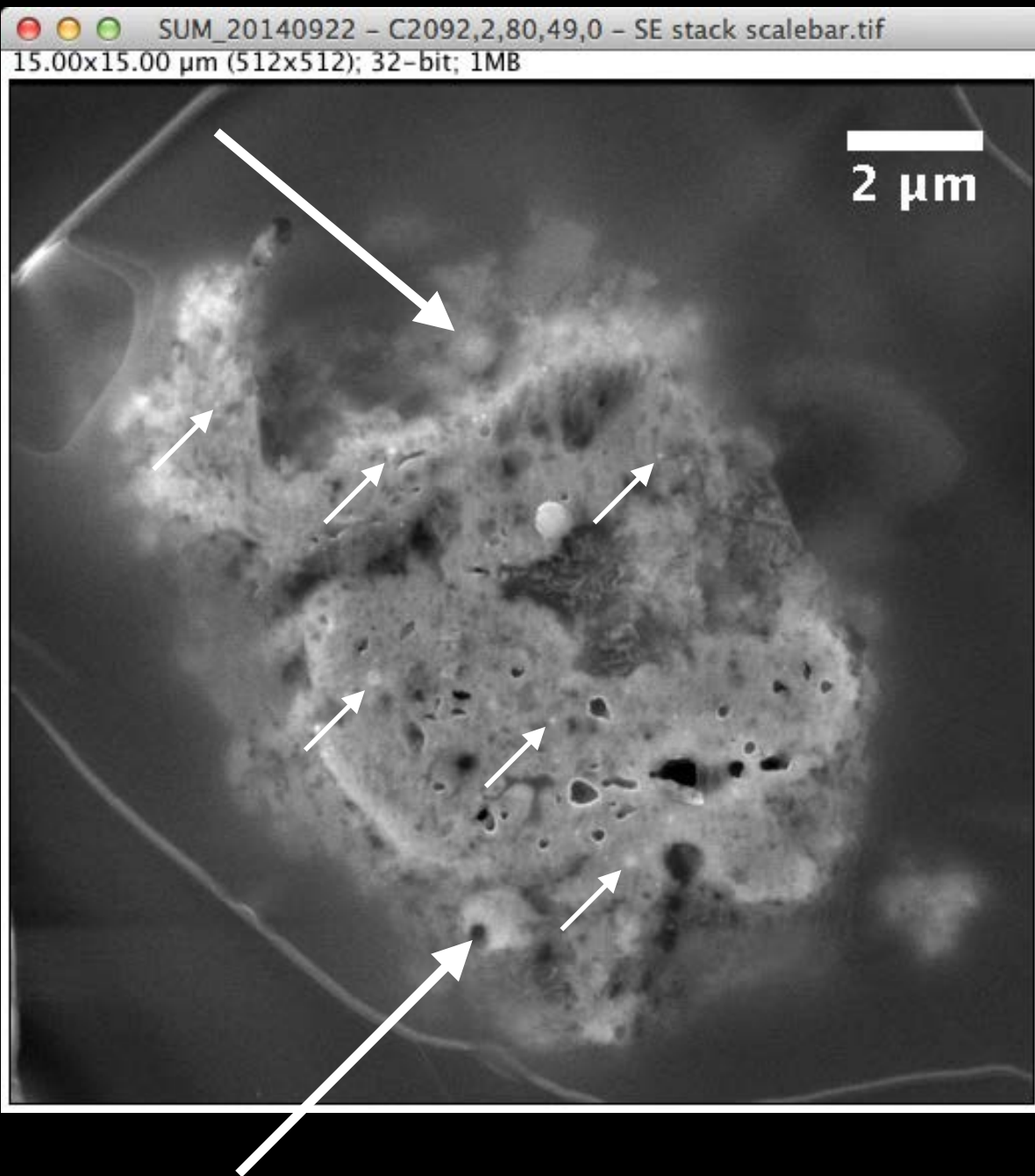
C2092,2,80,49,0 - EDS



The big arrows mark out two Mg grains.

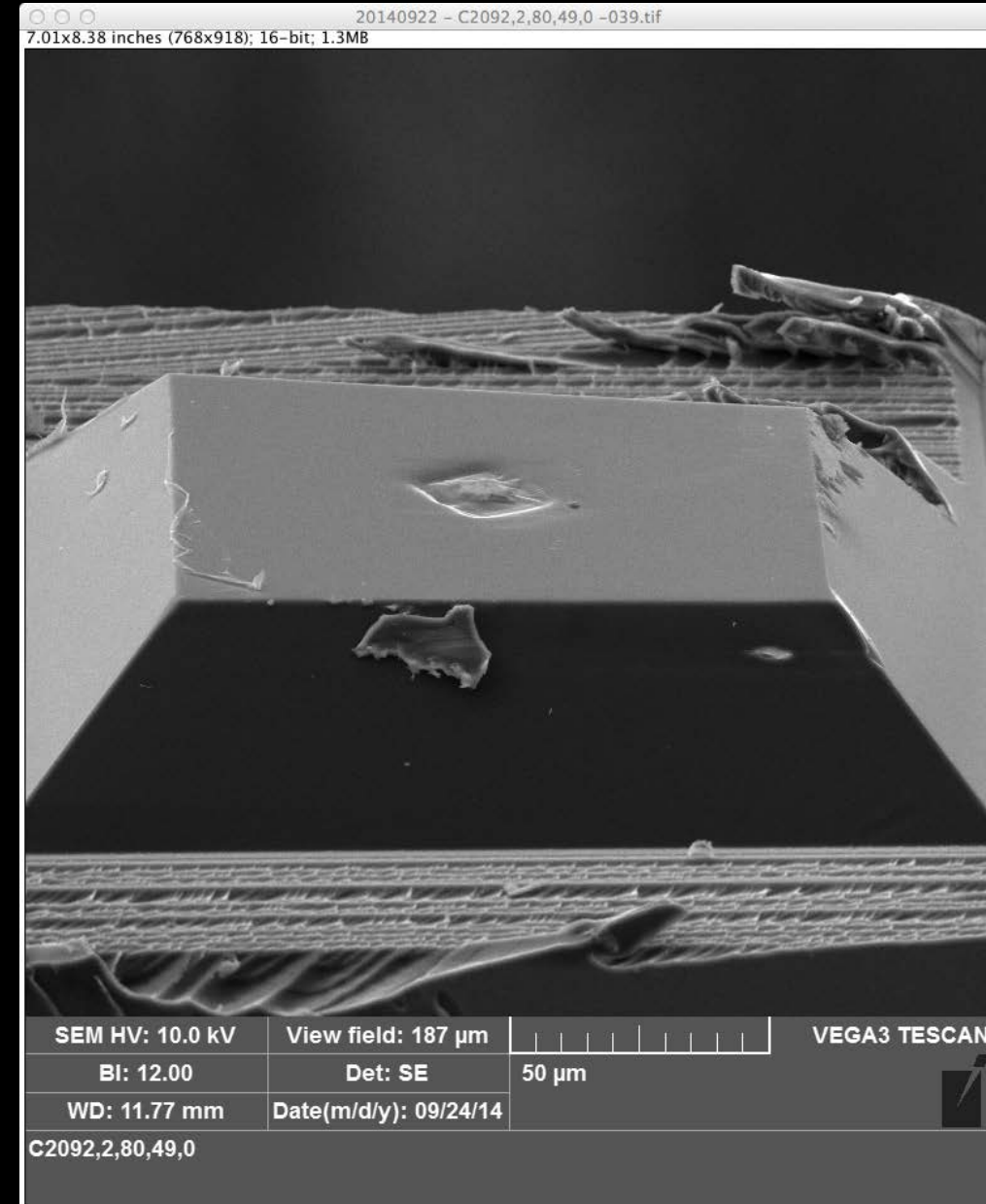
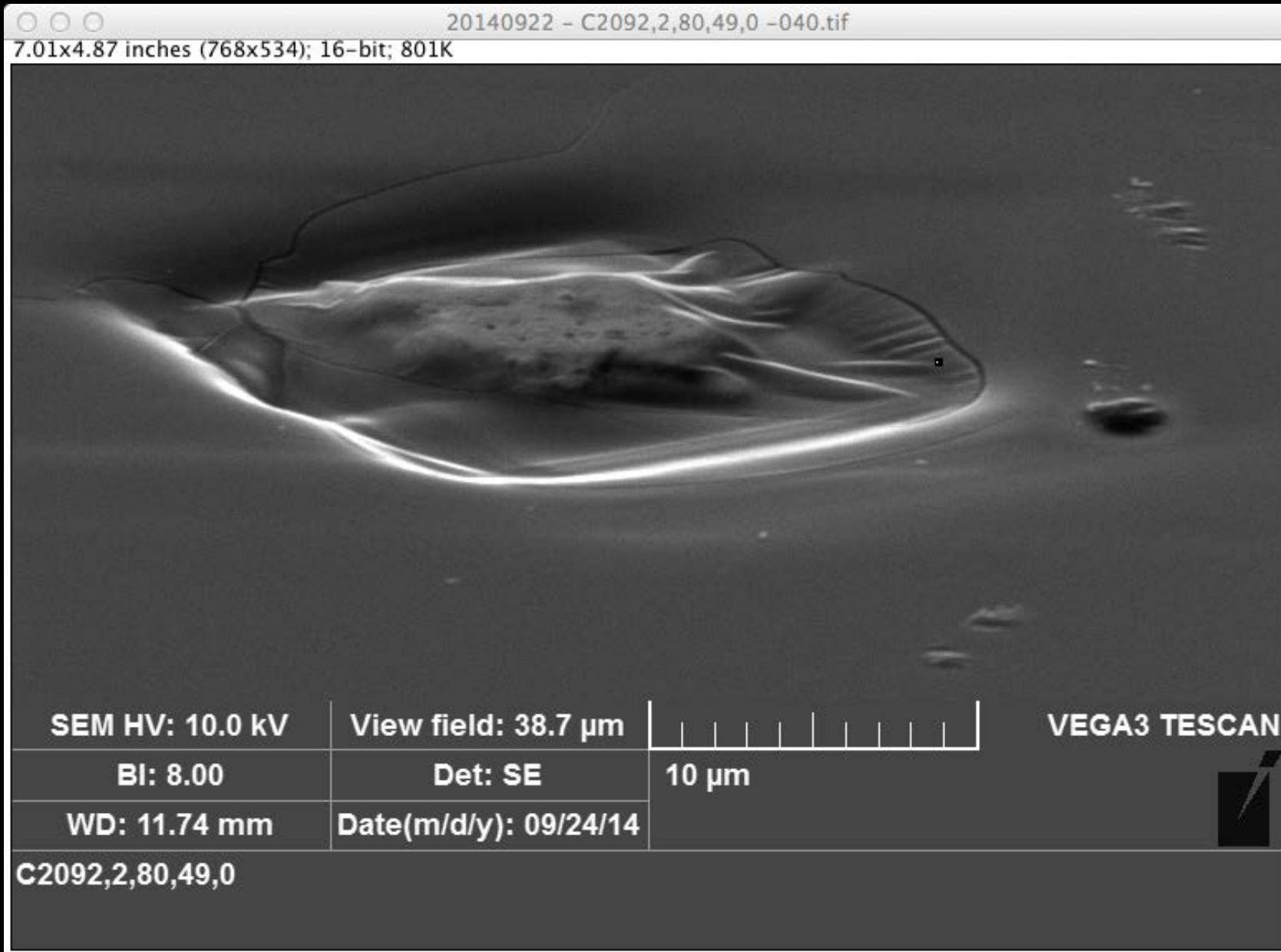
The little arrows also point out some other grains which are probably intact, but too small to see in the EDS.

C2092,2,80,49,0 - EDS



The bottom Mg hot-spot is pretty much Mg + Fe. Ballpark Mg#=70 (+/-20)

C2092,2,80,49,0 - After EDS



Fun hunt: can you find the dimple introduced by my EDS, not the previous experiments before the sample came to us? Hint, my box has the same rotation as the image, the previous raster is the obvious diamond shape.